University of Alberta

Complexity Science and the Education of Interdisciplinary Health Teams

by

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Abstract:

This dissertation traces the evolving collaboration among a diverse group of people—including the PhD candidate, Angus McMurtry—involved in organizing and instructing a large interdisciplinary health teams course at the University of Alberta ("Interdisciplinary Health Team Development" or INTD 410). The general aim in the research was to introduce new complexity-based ideas about interdisciplinary knowledge and team learning to a portion of the course's participants, curriculum and pedagogy and then study the resulting transformations. Our focus was not only how the ideas would affect the course and participants, but also how the course and participants would affect the ideas. Out of this interaction, we hoped that new knowledge and practices relating to the education of interdisciplinary health care teams would emerge. The dissertation is presented as an on-going action research spiral, with three distinct cycles of reflection, planning, action and observation.

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Introduction

Collaboration Across Disciplines

> …small groups have the opportunity to be more than just the sum of their parts. A successful face-to-face group is more than just collectively intelligent. It makes everyone work harder, think smarter, and reach better conclusions than they would have on their own.
> -James Surowiecki (2004, p. 176)

Many of the most challenging problems of the 21st century are being solved not by 'lone geniuses' but by groups of people with different kinds of expertise. For example, the coronavirus that triggered the recent SARS epidemic was, according to the World Health Organization, discovered through the collaborative efforts of research labs all over the world (Surowiecki, 2004, p. 160). Such collaboration is not limited to science; for instance, automakers are also making use of teams drawn from diverse areas of their plants to solve even the most routine manufacturing problems (Watts, 2003, p. 269).

Health care systems, in particular, seem poised to capitalize on collective thinking and problem solving. The phenomenon of interdisciplinary health teams is set to transform the Canadian Healthcare System: Universities across the country are beginning to offer courses in interdisciplinary health team development, and one of the five pillars of Health Canada's current $800 million push to reform primary health care is the establishment of multi-disciplinary teams (Health Canada, 2005).

There is thus a widely held conviction that allowing differing kinds of professional expertise to interact or build on one another will result in more intelligent health care solutions—solutions that offer more than a mere sum of the various sorts of professional expertise considered separately.

However, health care educators are only just beginning to develop the conceptual tools required for understanding and nurturing such interdisciplinary, team-level learning. As health team writer Ray (1998) states, "[t]he requirements for effective teamwork are not generally understood" (p. 1372). D'Amour et al. (2005) elaborate:

> …we have limited understanding of the complexity of relationships between professionals (in this case health professionals) who, throughout their education, are socialized to adopt a discipline-specific vision of their clientele and the services they offer. (p. 117)

One of the problems, according to Bleakley (2006), is that "most commonly applied learning theories in medical education continue to be those that focus upon an isolated individual rather than the sociocultural context for learning" (p. 151). There is, he argues, a need for other models better suited to the dynamism and complexity of clinical teams, models that take in to account distributed knowledge, relations among people and artefacts, dynamic environments, and so on.

In education and related fields that study human learning, however, a number of discourses have for many years explored how learning occurs beyond the individual level in complex and dynamic social settings. Notable examples that Bleakley (2006) himself identifies as offering potentially useful models include activity theory, communities of practice, and the discourse that this paper is most concerned with: complexity theory.

The topic of interdisciplinary health teams would thus seem to offer an excellent opportunity for collaboration between the fields of healthcare and education. Although the differing sorts of knowledge these two areas bring with respect to the topic might create some initial barriers to collaboration, their very differences also present the possibility for generating new and innovative knowledge and practices. That is, interdisciplinary collaboration between those in healthcare and education might very well be the best way to study and nurture the phenomenon of interdisciplinary health team learning.

One example of such doubly interdisciplinary collaboration is the focus of this dissertation. It traces the evolving collaboration among a diverse group of people, including myself, involved in organizing and instructing a large interdisciplinary health teams course at the University of Alberta ("Interdisciplinary Health Team Development" or INTD 410). The general aim in the research was to find out what would happen if new complexity-based ideas about interdisciplinary knowledge and team learning were introduced to a portion of the course's participants, curriculum and pedagogy. Our concern was not only how the ideas would affect the course and participants, but also how the course and participants would affect the ideas. Out of this interaction, we hoped that new knowledge and practices relating to the education of interdisciplinary health care teams would emerge.

Research Method: Action Research

At this point, I should introduce the method that has guided this research, that is, action research. Indeed, its influence can already be seen in the preceding section, for instance, in the focus on collaboration and mutual interaction between theory and practice. In this section, I set out some of the key principles of action research. In the following sections, I describe how these principles guide the structure of this dissertation and how they are particularly well-suited to the theoretical frame and topic of this dissertation.

Distinctive features of action research include 1) its collaborative, reflexive nature and foregrounding of ethical concerns, 2) its claim to respect principles of democratic participation, 3) its aim of creating new knowledge, and 4) a spiral process of reflection, planning, acting, observing, reflection, and so on.

Although some action research examines only individual practices, most involves collaboration with other people. As Creswell (2002) writes, "[a]ction researchers collaborate with others, often involving coparticipants in the research" (p. 614). Indeed, many forms of action research can be seen as breaking down the traditional one-way relationship between researchers and researched, as it seeks to involve research "subjects" in planning, interpretation and knowledge construction relating to the research (Moore, 2004, p. 150).

Related to this emphasis on collaboration and mutual affect is action research's tendency to have a strong reflective dimension; it is often as concerned with the researchers' own beliefs and practices as it is about the situation under study (Winter, 2002, p. 28). In fact, Sumara and Carson (1997) have suggested the action research highlights the inseparability of an educational researcher from the research he or she pursues—a realization that has important epistemological and ethical implications (xvii). Sumara and Davis (1997) state this point even more strongly: "Whether we choose to acknowledge it or not, as researchers, we are never merely interruptions in the ongoing events of others' lives. We are always and already participating in the unfolding of lives" (p. 304). It is therefore crucial for action researchers to reflect on their own participation in research activities as well as to face their inevitable ethical entanglements.

Action research literature also offers a number of principles to ensure the democratic participation of co-collaborators. Adelman (1993) for instance, asserts that research faithful to the vision of Kurt Lewin (considered by most to be the founder of action research) must include the *active participation* of those affected by the issue or change to be studied (p. 9). In the context of action research in modern day Brazil, Valla (2002) writes that true democracy means authentically involving those affected by an issue in knowledge construction with respect to that issue (p. 170); participants must feel that without their contribution, the knowledge could not have been produced (p. 173).

Of course, such principles are often difficult to enact in concrete situations, and there has been discussion within the action research community concerning issues such as 1) at what point the participants must begin their involvement in the research and how conscious their initial involvement must be (Valla, 2002 p. 173); 2) how to negotiate differences in collaborators' contributions, often due to their varying knowledge, expertise and resources (Kanu, 1997, p. 172); and 3) the importance of outsiders negotiating entry to a site and being sensitive to other participants' involvement (Creswell, 2002, p. 614).

A third distinguishing feature of action research is its aim of creating new knowledge grounded in participants' concrete situations and practices. Unlike most traditional academic researchers, action researchers do not seek to be objective or discover universally applicable knowledge. They are less concerned with particular methods than with developing a profound understanding of what it sets out to investigate (Kanu, 1997, 171). Indeed, some action researchers have argued that it is precisely this appreciation for the complexities of particular situations that makes action research so readily transferable to other situations (Green, 2002, p. 123).

Action research's purpose then, is not simply to apply theoretical knowledge to practice, but rather to create new knowledge through the mutual interaction of theory and practice in a concrete context. As Winter (2002) writes,

> What is specific to 'action research' as a form of inquiry is that it uses the experience of being committed to trying to improve some practical aspect of a practical situation as a means for developing our understanding of it. (p. 27)

Finally, most action research follows (at least approximately) "spiral cycles of reflection, planning, acting, reflection, and replanning." (Carson, 1989, p. 3). The specific starting point, or "trigger", of this process can be difficult to determine but may be as simple as the decision by an individual or group to investigate a topic of interest.

Unlike traditional academic research, therefore, action research "does not follow a linear pattern of a causal sequence from a problem to action" (Creswell, 2002, p. 615). Unforeseen issues, relating to both the topic of research and the researchers themselves, may emerge during the research process, and so the direction of the research itself can change (Biott, 2002, p. 47; Moore, 2004, p. 152). Action researchers see this lack of rigidity not as a weakness, but rather as demonstrating authenticity and responsiveness to the focus and context of the research (Biott, 2002, p. 53).

Due to its evolving and flexible structure, action research reports do not usually begin with an exhaustive literature review; rather, references to theory and literature should permeate each chapter, to address the issues that emerge (Green, 2002, p. 126). As Winter (2002) puts it,

> Action research…does not aim to make and initial 'comprehensive' review of all previous relevant knowledge; rather it aims instead at being *flexible and creative* as it *improvises* the relevance of different types of theory at different stages of the work. (This improvisatory process probably also describes the actual *practice* of 'academic' inquiry, but for an action research project it describes the underlying *principle* as well.) (p. 36; italics in original)

Dissertation Structure

The action research spiral—reflection, planning, action and observation, followed further reflection, planning and so on—is an abstract representation. Actual studies rarely fit the spiral process in a neat and tidy way. Nonetheless, this dissertation uses the spiral process as an organizing structure. The research is presented as an action research spiral composed of three cycles, preceded by a triggering event.

Chapter 1 describes the "trigger", that is, the series of events that led up to and framed my collaboration with the organizers and instructors of INTD 410.

Chapters 2 to 5 focus on the first action research cycle, in which I collaborate with the course organizers to introduce new complexity-based educational ideas into the course curriculum. As we shall see, this cycle takes place largely in the realm of ideas, as we try to build bridges between existing course materials based on current healthcare literature, and new complexivist understandings of interdisciplinary knowledge and team learning.

Chapters 6 to 8 deal with the second action research cycle, which took place immediately before, during and after the course (INTD 410) took place. In this cycle, I collaborate with classroom facilitators to see how the ideas developed in the first cycle relate to their interdisciplinary practice and pedagogy. As we shall see, both practices and ideas are significantly affected through this interaction.

Chapters 9 to 11 report on the third—and as yet unfinished—cycle, which addresses the widening effects of the research in relation to the surrounding academic and healthcare communities. Unlike the other cycle, this one was not a planned part of the research over which I had much control. Nonetheless, as Sumara and Davis (1997) note, both complexity science and action research principles compel researchers to acknowledge their complicity in relation to not only their co-participants but also the wider effects that "always spills [sic] beyond the group of persons immediately involved" (304). In this final cycle, I also reflect on the dissertation research as a whole, its contribution to the literature on interdisciplinary learning, and possible future directions for research.

Interweaving Frames: Complexity, Action Research & Interdisciplinarity

Three interweaving clusters of ideas permeate this dissertation: interdisciplinarity, action research and complexity science. As we have seen, the research is interdisciplinarity, both in its explicit subject matter (interdisciplinary health teams) and the collaborative manner in which this subject matter is investigated. Action research also plays a dual role, providing both a research methodology and a general organizing framework.

Complexity science plays multiple roles as well. First, complexivist understandings of interdisciplinary knowledge and teamwork are an explicit focus of participants' collaboration. Second, it offers a general theoretical framework for interpreting the observations made in this dissertation. Specific complexivist concepts such as emergence, nested systems, and its expanded definition of what counts as a learner, for example, figure prominently in discussions. (These concepts are discussed in much greater detail at the beginning of Chapter 2.)

These three clusters of ideas are quite compatible and many authors have drawn links between them. Watts and Jones (2002), for instance, have argued that interdisciplinary teamwork and action research methods have much in common and can support and enhance one another. Specific examples of shared characteristics include a collaborative approach to problem solving, the need to negotiate between differing kinds of knowledge, a sharing of power and decision making, and the development on innovative ideas through dialogue and feedback (Watts & Jones, 2002, p. 236).

Links have also been made between action research and complexity science. Davis and Sumara (1997) have argued that action research can be seen as embodying complexivist principles, for example, through its refusal to "objectively" separate researchers from their research contexts or to analyze complex situations in reductive and mechanistic terms (p. 301).

Finally, a number of authors have argued that complexity may provide a key for understanding interdisciplinary thinking and integration. As leading interdisciplinary theorist Newell (2001) writes, "complex systems theory holds the potential not only for validating…interdisciplinary process, but also for assisting us in conceptualizing and evaluating interdisciplinary integration" (p. 19). Davis and Sumara (2006) put it somewhat differently, arguing that what they call "complexity thinking" provides a sort of "interdiscourse", that is, a way to "read across" and blend—without reducing or collapsing—discourses concerned with differing phenomena (pp. 8, 159).

In any case, these ideas about interdisciplinarity, action research and complexity make many appearances in the following chapters. Along with other theoretical influences that arise, they weave together to give form and meaning to events that emerge throughout the collaborative research process.

Data Gathering & Analysis

Having introduced the general structure and theoretical orientation of the dissertation, I now offer a description of the specific methods used to gather data. The research involves two groups of participants: eight "organizers" who oversaw and administered the course, and eight of the over 50 "facilitators" who worked directly with students. (Students themselves were not research subjects or participants.) Informed, written consent was sought and received from all participants.

My collaboration with the course *organizers* is described in the first action research cycle and, to a lesser extent, in the third cycle. The data I collected focused on their understanding of interdisciplinary learning and pedagogy, including how changes in their understanding influenced their administration of the course. The methods used to collect this data included keeping detailed written notes of meetings and email exchanges, as well as careful analyses of alterations in the course materials, especially the facilitator and student manuals. Since sound recordings were not made at his point in the research, 'participant voice' is not heard directly in the first cycle; instead, it is largely mediated through my reportage.

My collaboration with the *facilitators* is described more fully in the second action research cycle, with a detailed description of the data gathering methods used in Chapter 6. As with the organizers, the data I gathered from the facilitators focused on their understandings and practices related to interdisciplinary learning and pedagogy. However, in addition to keeping detailed notes on meetings and email exchanges, I also conducted (and audio recorded) in-depth interviews with each of the facilitators individually, as well as a focus group. The second cycle thus includes very extensive 'participant voice', in the form of numerous direct quotations.

The third action research cycle addresses the on-going effects of the research on myself, the course organizers, certain facilitators, and wider academic and healthcare communities. As discussed earlier, the third cycle was not a deliberately planned part of the research, nor one over which I had much control. Data in this cycle was therefore collected through less formal means, consisting mostly of my observations, notes and email exchanges, as well as participant feedback.

The data gathering in all three cycles focused on a few interconnected yet distinguishable levels of phenomena: first, myself as an individual involved in the research; second, the social collective composed of the people (including myself) directly involved in the course; and third, the surrounding academic and professional communities. The data collection techniques described above were primarily oriented towards the second two levels, that is, the social collective and surrounding communities. To reflexively track my involvement as an individual, I kept "diary of participation" in which I recorded my thoughts, feelings and motivations in relation to developments in the course.

Finally, the results of this research were shared with both sets of participants in a variety of ways. First, during the data gathering process, brief written synopses of data and emergent interpretations were periodically shared with organizers and facilitators through meetings and emails. Second, in order to solicit their input and critique, portions of the dissertation were shared with organizers and facilitators as it was being written. Each group was sent that portion of the research in which they were involved, and each person was encouraged to draw my attention to any event or interpretation that he or she felt had been misrepresented in any way whatsoever.

The data gathered through these methods is analyzed and discussed in great detail in the three action research cycles that follow. The primary purpose that these methods serve is to trace the mutual interaction between, on the one hand, the complexity-based ideas about team learning and interdisciplinary integration and, on the other, the course and research participants (including myself, the organizers and specific facilitators). Because the course and participants were embedded in specific professional and academic communities, observations concerning their relationships to these larger communities are included as well.

As we shall see in the first two action research spirals, a number of significant changes in thinking and practices came about through this mutual interaction. Among these changes were new insights concerning the nature of team learning and how best to support it; a deep problematization of the commonly held assumption that interdisciplinary teams can and should operate on the basis of 'consensus'; and a new framework for integrating the contributions of different disciplinary perspectives. The research activities also triggered changes in the wider professional and academic communities in which the participants were embedded; these latter effects are described in the third action research cycle.

1.0 Chapter 1: Trigger: A Fortuitous Connection

Mid way through my PhD studies in Education at the University of Alberta, I took part in what would turn out to be a crucial meeting with my two primary academic supervisors. Our goal at the meeting was to identify a specific focus for my PhD thesis, one that fit well with my research interests and background. This was, however, not a straight-forward task, due to my very unusual career path.

In the first place, unlike virtually every other student in my department, I lacked a BEd degree and had never been employed as a classroom teacher. Instead, I had spent significant amounts of time embedded in a wide variety of academic and professional areas. My undergraduate degree was in philosophy, and I had nearly enough credits in economics to make it a minor concentration.

Next; I studied law. During those three years I found out what it was like to be immersed in a well-established professional culture—a culture that challenges one to significantly reconstruct one's identity and relation to the world. When I emerged three years later, I was a changed person, though perhaps not so changed as my professors had hoped. Instead of taking an articling position with a law firm, as was expected, I joined an old friend of mine in starting a small software company.

The company was formed to create an educational career guide for students called "Career Cruising". This was the early 90s and interactive technologies were just starting to enter the consciousness of mainstream culture. Our idea was to conduct multimedia interviews (text, sound, photos, video) with people from hundreds of different occupations and put them all on a CD-ROM (and later a website).

The experience of making Career Cruising expanded my understanding of different disciplines, professions and occupations in a number of ways. First, I learned about starting and running a business at a very practical, grassroots level. Because it was a business that involved close collaboration among people with very different skills—computer programming, graphic design, law, writing, sales, marketing, photography and videography, to name but a few—I learned how to work as part of an interdisciplinary team on a common project.

Third, as someone actually charged with researching and interviewing people from hundreds of different occupations—everything from accounting to mechanics to zoology—I was exposed to an enormous variety of workplaces and practices. During this time, I grew to appreciate the unique history and context of each area. Each had its own complex web of knowledge and practices that could only really be understood from within, by those who had spent a significant amount of time immersed in its day-to-day practices. As a researcher and interviewer, I had to be very careful not to impose the logic and assumptions of one area on another.

Finally, when I was not helping to develop Career Cruising's content, I was meeting with teachers and administrators from school boards across Canada, learning about their career education and guidance curricula, and finding ways to tailor our program and lesson plans to their needs. This experience gave me a valuable inside perspective on the relationships among official curriculum, school board administrators, and the day-to-day realities of classroom teachers.

After several years with Career Cruising, however, I again grew restless. I began taking part-time graduate level courses in education at a local university and cultivated an interest in new theories of learning. One area that particularly captured my interest was complexity science and its development in relation to epistemology, ethics and education. For a long time, I had harboured a deep suspicion of the more analytic branches of philosophic thought and their application to human knowledge and society. Complexity seemed to provide both a clear articulation of the limits of such analytic methods and a very persuasive alternative explanatory framework.

After finishing my master's studies, then, I 'took the leap' and enrolled in PhD studies at the University of Alberta. During my PhD, I immersed myself in complexity and related educational discourses like radical constructivism, communities of practice and activity theory, usually applying them to matters of professional, interprofessional, workplace and collective knowing.

At the fateful meeting concerning my PhD research, therefore, my two academic supervisors and I were trying to find a concrete educational focus that would bring together my various academic interests and professional experiences. After much brainstorming, one brought up the topic of interdisciplinary teams. She noted that the topic was of growing importance in educational workplace literature, particularly in the context of healthcare.

We all agreed that studying and working with such teams might offer an excellent way to explore the relationships between different professional paradigms, as well as how people versed in these paradigms manage to work and learn together, in spite of their differences. One important challenge, however, was to find an interdisciplinary group willing to take part in this research.

At that point, the other supervisor recalled some discussions he had had with members of the InterProfessional Initiative (IPI) group at the University of Alberta. Under the auspices of the University's Health Sciences Council, this group was responsible for a variety of research, practice and community service activities, both at the University and in the surrounding community. One of their activities was administering an interdisciplinary health teams course taken by students in the university's health disciplines.

David Cook, a professor in Faculty of Medicine at the University of Alberta and a member of the IPI group, offers the following brief summary of the history and organization of "Interdisciplinary health team development" (INTD 410):

> The University of Alberta had one of the first interprofessional courses in Canada, which was an elective program that started in the early 1990s. In the late 1990s an office of the Health Sciences Council was formed and became the home for a series of planning committees that ultimately organized the Interdisciplinary 410 course that was introduced in 1999. It is a mandatory course for all students in the ten Health Sciences programs at Alberta, and has a registration of nearly 900 students. The students are assigned to interprofessional teams and carry out a series of exercises designed to familiarize themselves with each other's profession and to enable them to practice team function. Six such teams share two supervisors one of whom usually has an academic appointment, while the other is from the community. The exercises include intake and discharge planning for an elderly patient with iatrogenic flurazepam overdose, discussions of various ethical dilemmas and a community education project. Students must pass the course to continue in their programs. (Cook, 2001, p. 112)

In conversations with the latter supervisor, members of the IPI Group had expressed interest in bringing new ideas about learning and teamwork into their course curriculum, especially the first few classes dealing with teamwork in an interdisciplinary context.

Although I had no direct professional experience in healthcare, I had extensive vicarious experience. In addition to the research and interviews I did with people in various healthcare professions at Career Cruising, my close family members include a surgeon, a nurse, a physical therapist, an occupational therapist and a psychologist. I had seen up close how even these closely related professions had significant differences in knowledge, practices and assumptions that had to be negotiated when confronting complex issues. Furthermore, I had a strong affinity for the orientation these professions have towards the public good, both in terms of patient outcomes and larger-scale social and ecological levels. The opportunity to do research in a healthcare context therefore greatly appealed to me.

At the conclusion of our meeting, it was decided that my supervisor would arrange a meeting between me and his contacts in the IPI Group that oversaw INTD 410, in order to explore possible areas of collaboration. The meeting occurred several months later and included me, my academic supervisor, the coordinator of INTD 410, and a faculty member from one of the health sciences disciplines who had been involved in designing and teaching the course since the mid-1990s.

The meeting went well, and we agreed that there were several areas in which we might be able to collaborate—that is, to productively combine what I knew about professional knowledge, complexity science and other new theories of learning, with what they knew about various healthcare disciplines, teamwork skills and experience in teaching their own course. It was decided that I would carefully review the course manual in order to look for specific opportunities for action and change, then present my findings for discussion at the annual meeting for course organizers (that is, the course coordinator and people from various faculties who oversaw the course).

As we shall see in Chapter 3, at the annual meeting I suggested a number of specific changes that could be made to the readings and activities for the first two classes, as well as several ways in which I could work with course facilitators to bring new ideas about team learning into their pedagogy. These suggestions were generally well received and elaborated on by the organizers. We decided that I would work with the course coordinator and several other organizers to begin enacting the changes during the upcoming 2005-2006 academic year.

Thus began my in-depth collaboration with INTD 410's organizers and facilitators (the faculty and community people who actually instructed and supervised the students). Although one can already detect elements of reflection, planning, action and observation in this first chapter, I have chosen to treat it as a "trigger" for the more fully realized action research cycles that resulted from it. The next chapter deals with the first of these cycles, one in which I collaborate with the course organizers to introduce new complexity-based educational ideas into the course curriculum. As we shall see, this cycle takes place largely in the realm of ideas, as we try to build bridges between existing course materials based on current healthcare literature, and new complexivist understandings of interdisciplinary knowledge and team learning.

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Cycle 1: Integrating New Ideas

As discussed in the Introduction, this part of the dissertation deals with what I shall treat as the first action research cycle. That is, the spiral process of reflection, planning, action and observation is used as an organizing structure, even though the actual research process was of course not so tidy. This first cycle involves my collaboration with the course organizers to introduce new complexity-based educational ideas into the course curriculum. The specific focus of our collaboration is the attempt to build bridges between new complexivist understandings of interdisciplinary knowledge and team learning on the one hand, and existing course materials based on current healthcare literature on the other.

2.0 Chapter 2: Reflection

2.1 Introduction to Complexity Science and its Relevance for Education

> I think the next century will be the century of complexity.
> - Stephen Hawking (Chui, 2000, p. 29A)

Complexity science, often called complexity theory or dynamical systems theory, is a promising cross-disciplinary discourse that has emerged in last few decades. It has arisen out of the failure of traditional analytic scientific methods to explain certain complex phenomena such as the human brain, ecosystems, and the economy.

Traditional analytic science seeks to understand and explain a phenomenon by "cutting it up" into its component parts. This is an adequate approach for studying mechanical systems, such as levers and automobiles, with behaviours that are the predictable sum of their parts. However, this approach works much less well when applied to complex, living systems. As Paul Cilliers (1998), a philosopher and influential writer in the area of complexity studies points out,

> A complex system is not constituted merely by the sum of its components, but also by the relationship between these components. In 'cutting up' a system, the analytical method destroys what it seeks to understand. (p. 2)

A complex system thus embodies possibilities exceeding the sum of its components, possibilities that emerge at the level of the system as a whole. A prototypical example of such emergent possibilities is the way a living human being has possibilities for action that go beyond the possibilities for action that a simple aggregation of bodily organs would have. This phenomenon of emergence also applies to larger scale living systems like social collectives; a group of people collaborating together as a company or academic community, for instance, can accomplish more and generate more possibilities than those same people working in isolation.

The evolving science of complexity offers a number of powerful conceptual tools for understanding and affecting complex systems, including the sorts of social collectives that this paper is concerned with. The first six I deal with are related to *understanding* the dynamic behaviour of complex systems: 1) self-organization, 2) adaptation, 3) an expanded definition of what counts as a learner, 4) nestedness, 5) the incommensurability of different complex systems, and 6) a participatory epistemology. The next group of three paired concepts relate to the conditions for *affecting* or *supporting* the emergence of intelligence and expanded possibilities for action in complex systems: 1) diversity & commonality, 2) openness & constraints, and 3) decentralized interactions & organization.

Ultimately, the aim is to bring these ideas to bear on the specific foci of this research, namely, the relationships between differing professional disciplines and interdisciplinary health teams. In this section, however, I confine myself to a more general examination of the concepts.

2.2 Conceptual Tools: Understanding Complexity

The first of the six complexivist concepts related to understanding complex systems' behaviour is that of self-organization. Complex learning systems emerge through the dynamic, non-linear interaction of their component parts. Since complex systems arise in this manner, rather than from the imposition of 'top-down' instructions, their form of organization is often described as being decentralized, or 'bottom up', in nature. Although top-down processes can emerge within sufficiently complex systems, they always arise in and through the on-going, bottom-up activities of the system itself and never as a unidirectional, controlling cause (Juarrero, 1999).

A crucial consequence of complex systems' self-organization is that they cannot be reduced to, or understood in terms of, straightforward causal inputs and outputs. They "change their own operations through operating" (Davis & Simmt, 2003, p. 139) and thus resist direct, external control or accurate prediction—a quality that sets them apart from the mechanical systems studied by traditional analytic scientific methods. An illustrative example of the self-organizing quality of complex systems is provided by philosopher and physicist, Fritjof Capra (2002):

> [W]hen you kick a stone, it will react to the kick according to a linear chain of cause and effect. Its behavior can be calculated by applying the basic laws of Newtonian mechanics. When you kick a dog, the situation is quite different. The dog will respond with structural changes according to its own nature and (nonlinear) pattern of organization. The resulting behavior is generally unpredictable. (p. 35)

A second useful conceptual tool is adaptation. Complex systems are adaptive because they change their own structure *in response to* internal or external pressures. A complex system's structure—that is, the dynamic relations among its component parts—adapts to, or couples with, its environment (though in a self-organizing rather than deterministic fashion).

An important consequence of adaptation is the importance of context and history. Complex systems are always open systems: They interact with and adapt to their specific environments (Cilliers, 1998). Indeed, most complex systems are so interwoven with their environments that it is often difficult to define their borders. To understand a complex system, then, one must take into account its particular history and context. Juarerro (1999) suggests that, because complex systems are so "fundamentally rooted in their environment and history", they are better explained hermeneutically and narratively than deductively or through the application of covering laws (pp. 223, 252).

For example, one cannot understand animal species without understanding the nature and history of the ecosystem within which they evolved; giraffes' extraordinarily long necks make little sense until one places them within the dynamic context of high trees and competition for scarce food sources. It is for this reason that complex systems are said to embody their history in their structure.

It should be emphasized although complex systems are inextricably linked to their environments and dependent on them, they are never determined by them. As mentioned above, complex systems' behaviour are governed by their own self-organizing, dynamic internal structures and thus cannot be reduced to, or understood in terms of, straightforward causal inputs and outputs. As we shall see below, complex systems must thus be understood at the level of their emergence; one cannot fully understand them either by 'looking down' to their components (because of emergent characteristics and their adaptation to their environments), or by 'looking up' to their environments or contexts (because they are self-organizing).

A third conceptual tool offered by complexity concerns what counts as a living, learning entity. It has been observed that those who study complexity define complex systems in terms of their particular research interests (Goldberg, 2003). From the perspective of educators and others concerned with the phenomenon of learning, complex systems' adaptive, self-organizing qualities mean that they can be understood as *learners* (Davis & Sumara, 2006). Knowledge is therefore not seen as limited to individual brains; it is also enacted and embodied in the relational, networked activities of complex 'learning' systems that emerge at multiple biological and cultural levels—everything from amoebas and ecosystems to human beings, classrooms and societies (Capra, 2002; Davis, 2004; Maturana & Varela, 1987). This means that social collectives can quite literally be seen as 'learners'.

The fourth useful concept offered by complexity, *nestedness*, addresses the nature of the relationships between such living, learning complex systems. Complex systems are nested forms, in the sense that they both form part of larger complex wholes and are themselves composed of other, smaller scale systems. For instance, in the case of human beings, this 'nestedness' can be extended in both micro and macro dimensions. Cells and organs can be as nesting within the human body as a complex whole, which in turn exists within larger scale, or "higher order", social and physical systems (Bell et al., 2002, p. 135). (See **Appendix A**, p. 165, for a diagram that attempts to foreground some of the nested complex systems relevant to *education*, as well as fields of inquiry associated with their study.)

A fifth useful insight offered by complexity science concerns the incommensurability of different systems. Because of their self-organizing and adaptive qualities, one complex system can never be collapsed into a mere instance, variation, or elaboration of another. Nor can two systems be entirely reduced to a common underlying phenomenon. As Davis and Simmt (2003) write,

> …complex unities must be studied at the levels of their emergence… complexity science suggests that discourses concerned with different phenomena (such as radical or social constructivism—or neurology, ecology, or biological evolution) can be simultaneously incommensurate with one another and appropriate to their particular research foci….(p. 143)

A similar view regarding the irreducibility of discourses concerned with different phenomena has been expressed by Nobel laureate Phillip Anderson. In his classic 1972 paper, "More is Different: Broken Symmetry and the Nature of the Hierarchical Structure of Science," he writes that no field of science is necessarily more fundamental than another. Disciplines concerned with larger scale phenomena, such as chemistry, molecular biology and medical sciences, have unique "complications" and new types of behaviour that cannot be entirely reduced to particle physics or other rules originating at a more "fundamental" level (Anderson, 1972, p. 396). A comparable point could be made about the social sciences and how they cannot be dismissed as merely vague extrapolations of the 'hard' sciences.

Finally, a sixth philosophical concept or orientation that is present in many complexivist writings is a participatory epistemology. By participatory epistemology, I mean the view that we do not come to know the world in a detached, entirely objective way. Rather, our knowledge is in the world and, because it is embodied in our actions, our knowledge contributes to the unfolding of the world.

Participatory epistemologies can be seen in the work of many complexivist researchers. Karpiak (2000) for instance describes how scientists using the "new paradigm" of chaos, emergence, complexity and evolution "declare themselves to be scientists *within* nature"—in contrast to classical scientists who "described the world from a standpoint outside of nature" (p. 31). This participatory, or 'inside', brings with it certain ethical implications. As Bai (2003) writes,

> We cannot avoid responsibility because we cannot avoid responding in some ways to each and every person and situation we encounter and thereby affecting the world in some ways. (p. 27)

Participatory epistemologies are also evinced in closely linked theories like Maturana and Varela's enactivism. Statements like "[a]ll doing is knowing and all knowing is doing" (Maturana and Varela, 1987, p. 27) and "[e]verything is said by an observer" (Maturana, 1987, p. 65) highlight how we and our knowledge are in the world, part of the phenomena we are trying to describe and that our descriptions (by changing us and our actions) change the world.

The six ideas I have highlighted—1) self-organization, 2) adaptation, 3) an expanded definition of what counts as a learner, 4) nestedness, 5) the incommensurability of different complex systems, and 6) a participatory epistemology—thus offer a generative framework for understanding complex systems, including the sorts of social collectives that this paper is concerned with. Together, they also depict a world in which participation, ecological connection and local diversity (or autonomy) all play important and interwoven roles. As we shall see at the end of this chapter, this worldview has important ethical dimensions.

2.3 Conceptual Tools: Supporting Complexity in Social Collectives

> …small groups have the opportunity to be more than just the sum of their parts. A successful face-to-face group is more than just collectively intelligent. It makes everyone work harder, think smarter, and reach better conclusions than they would have on their own.
> -James Surowiecki, The Wisdom of Crowds

For most of its history, research in the area of complexity has focused on *understanding* or *describing* complex systems and phenomena such as self-organization. More recently, there has been an increased emphasis on how to consciously play a role in nurturing the emergence of such systems. Most relevant to this paper is work by educational thinkers who have started to apply and develop complexity science in the context of teaching and learning, that is, as a way to support the emergence of intelligence individuals and collectives in formal education.

In his wide ranging study of contemporary, progressive educational thought, Doll (1993) makes connections between 1) complexity's concept of emergence as new structures emerging spontaneously, self-generatively, unpredictably from old ones (p. 66); 2) Piaget's "equilibration" model of development (p. 71); 3) Bruner's constructivism (p. 125); 4) Dewey's focus on recursive reflection (pp. 140-141); and 5) poststructuralist relational epistemologies (pp. 126-128). He brings these various and related influences together to develop what he calls a "postmodern perspective on curriculum", which emphasizes the "four Rs": richness, recursion, relations and rigour.

Osberg (2005) problematizes the commonplace notion of education as planned enculturation. Traditional educational curricula and environments, she writes, are designed to move learners in a linear fashion from their pre-existing condition to a more educated or enculturated state—for example, "creative" or "politically responsible" (p. 81). This notion, she writes, not only assumes that we can know the nature of the human subjects we are dealing with and what it means to be encultured, but is also based on a logic of linear progression and determinism—something contrary to the logic of complexity (p. 82). In contrast to this approach, she offers a more complexity-compatible understanding of education based on concept of emergence:

> If we want to shape human subjectivity in a way that is not linear or deterministic, then we cannot assume we know (once and for all) what or who we are dealing with at the outset, and we cannot have a pre-set goal (an idea of what this person should become). We have to participate in the shaping of human subjectivity without this knowledge. This is precisely where the logic of emergence is helpful. With the idea of emergence, educators must try to understand that the only knowledge which they have—about who they are dealing with, and the goal of their teaching—is a product of the emerging situation itself. This knowledge, in other words, is contingent, not static. We therefore participate in the shaping of subjectivity not from a fixed, pre-determined position, but from a position of extreme flexibility and responsiveness to the moment or space we are in. We educate in what might be called a 'space of emergence.' (p. 82)

In the context of higher education, Tosey (2002) has suggested a complexivist approach to education and assessment based on four concepts: self-organization, paradox, emergence and edge of chaos (p. 7). Self-organization can be seen in the way students, individually and as groups, learn according to their own 'rules', rather than in a predictable and controllable way (p. 9). Paradox refers to the fact that educational programs simultaneously open areas of inquiry and close others; as a result, we as educators are always exercising power and should openly acknowledge and reflect on how we do so (p. 14). He applies the concept of emergence to understand the way culture and knowledge arise through unpredictable interactions and that educational plans must adapt to such emerging constructions, rather than prescribe them in advance (p. 17). Finally, he writes that systems often operate best at edge of chaos, that is, in the zone between control and anarchy (p. 18). The challenge for educators is to become more comfortable working within such a context, creating conditions for learning but not trying to strictly prescribe or control that learning (pp. 19-20).

By far the most well-developed and influential articulation of complexity science in the context of education, however, has come from Davis and his collaborators: Sumara, Simmt and Luce Kapler (Davis, 2004; Davis & Simmt, 2003; Davis & Sumara, 2006; Davis, Sumara & Luce-Kapler, 2000). Like the previous authors, they argue that education should be more about creating conditions for learning to emerge than about trying to prescribe or control specific outcomes.

Based on an extensive study of complexity literature—especially those works concerned with nurturing, rather than just describing complex emergence—Davis and his collaborators have suggested a number of conditions that they think are most applicable in the context of formal education and human collectives. The most recent articulation of these conditions expressed them as a set of three complementary pairs: internal diversity & internal redundancy, randomness & coherence, and neighbouring interactions & distributed control (Davis & Sumara, 2006, pp. 135-136).

For the purposes of the current research, I drew extensively upon all of Davis and his collaborators' work to develop my own list of conditions to support the emergence of intelligent human collectives. The ultimate plan was to then explore how these conditions might contribute to understanding the education of interdisciplinary healthcare teams—and, in return, how this latter focus might contribute to the development of the conditions (this interaction of ideas is the focus of Chapters 4 and 5). In what follows, however, I confine myself to a more general description of these conditions.

Like Davis & Sumara (2006), I arranged the conditions in complementary pairs, since they can be understood in terms of achieving a balance:

1) Diversity & Commonality
2) Openness & Constraints
3) Decentralized Interactions & Organization

Diversity & Commonality

The first condition is diversity among the interacting agents that make up a complex system. It is the source of a system's intelligence, that is, its ability to respond appropriately and creatively to changing circumstances. In the context of human collectives, diversity "expands a group's set of possible solutions and allows the group to conceptualize problems in novel ways" (Surowiecki, 2004, p. 36).

The complement to diversity is commonality or redundancy, the common ground that enables agents within a complex system to interact. In the context of human collectives, it refers to the shared subject matter, language, culture, history or training that helps a group "gel" and work together productively. Such commonality also makes a system more robust, since it allows agents to compensate for one another's lapses; for instance, if one member of a group is absent, others can step in and play a similar role.

Openness & Constraints

The second pair of conditions are concerned with finding an appropriate balance between, on the one hand, rules or boundaries that are necessary to orient and sustain the coherence of a complex system and, on the other, sufficient openness for diversity to express itself and for the system as a whole to develop in innovative and unpredictable ways. In a game of soccer, for instance, there are strict rules governing boundaries, hand use, fouls and so on—but tremendous creativity and diverse possibilities are presented as well.

Although these conditions can be seen as being in balance, that does not mean that they are necessarily opposed. In fact many constraints can be seen as *enabling* creativity and freedom. As Davis et al. (2000) write about the rules of language,

> Language can be seen as a liberating constraint: At the same time that it works to limit the possibilities for thought, by preselecting associations and categories, it opens the floodgates to imaginative possibilities. (p. 245)

Setting the appropriate constraints can be tricky and depends on the particular system and context. In the context of human collectives, such as juries or committees, it might involve putting procedures in place to ensure that all members get a chance to speak, and that decisions are reached within a reasonable amount of time—but without in any way prejudging or predetermining what those decisions might be.

Decentralized Interactions & Organization

A great deal of recent research in complexity and network theory has shown that certain types of decentralized forms of organization are quite effective at adapting to changing circumstances and solving complex problems, whether at the cellular or social level. By contrast, highly centralized forms of organization rarely produce innovation (Watts, 2003, esp. chap. 9).

A fundamental characteristic of complex systems is their decentralized form of organization. Complex systems are not governed in a hierarchical or "top down" manner by a single agent within the system or by external forces. Instead, they emerge "bottom up" through the decentralized interactions of the agents or parts that compose them. Such decentralization does not mean that complex systems are disorganized; for instance, no one part of the human brain controls all its operations—and yet our thought and behaviour take on coherent overall patterns.

In the context of human collectives, balancing organization with decentralized interactions means both ensuring that coherent, collective decisions and actions are taken, and that the responsibility for these decisions and actions is shared among the participants (though not always equally). In the context of knowledge-oriented human collectives specifically, what needs to interact is not so much people's physical bodies as their ideas and interpretations. When diverse ideas and expertises are allowed to "bump up" against each other, everyone's understanding can be enriched and the horizon of possible solutions can be widened.

In summary, then, complexivist thinkers have developed a number of powerful conceptual tools both for *understanding* and for *affecting* or *supporting* the emergence of complex systems, including social collectives. In Chapter 4, I begin to apply these concepts to the specific topics of this paper, that is, interdisciplinary health teams and the relations between professional health disciplines.

2.4 Epistemological, Ethical and Political Implications

Before proceeding to Chapter 4, it is worth pausing to consider the epistemological, ethical and political dimensions of the aforementioned complexivist ideas. Such issues are clearly central to educational research. Indeed, they are especially important to foreground in the present context, since complexity science has often been associated with traditional, 'hard science' and its 'ethically neutral' objectivist epistemology.

In fact, the epistemological and ethical orientations developed by complexivist thinkers in education have much in common with social constructivist and critical discourses like Lave and Wenger's 'communities of practice', Engestrom's cultural historical activity theory, and critical pedagogy as articulated by Friere, Giroux and others. (I have set out the similarities and differences among these discourses and complexity science in more detail in previous publications: McMurtry, in press; McMurtry, 2006).

In the first place, complexity shares with social constructivist discourses a participatory approach to epistemology. In activity theory and communities of practice, this stance is evident in their depiction of people and social structures. Neither human nature nor social structures are fixed, 'natural' or predetermined. Rather, they evolve in relation to one another, as knowledge, activity and relations transform.

Lave and Wenger (1990), for instance, argue that "learning is an integral and inseparable aspect of social practice" (p. 31); that knowledge is always situated and cannot be decontextualized (pp. 33, 40); and that social "practice itself is in motion" as "masters and apprentices…act out their differences and discover their commonalities" within specific communities of practice (p. 116). Indeed, their stated goal is to establish a "historical-cultural theory of learning" (p. 37).

Similarly, activity theorists assert that individual persons and social collectives can only be understood dialectically, that is, historically and in relation to one another (Engestrom & Miettinen, 1999, p 10). Human knowledge and practices are, Engestrom (2001) writes, a function of the specific collective *activity systems* in which persons participate. Such systems cannot be explained through the application of generalized or "universal" standards. Rather,

> Activity systems take shape and get transformed over lengthy periods of time…[and] can only be understood against their own history. (Engestrom, 2001, p. 136)

As discussed above, many thinkers in complexity and related discourses like enactivism also assert that we cannot apprehend the world in a detached, objective manner. Instead, we and our knowledge are in the world, part of the phenomena we are trying to describe, and our descriptions (by changing us and our actions) change the world.

There is one important difference between complexity's epistemological orientation and that of the social constructivist discourses, however. While the latter understand our participation only in terms of socio-cultural phenomena and intersubjective understandings, complexity science expands this participatory approach beyond human culture to encompass the biological and ecological world as well (McMurtry, 2006). As we shall see in Chapter 4, this difference has important implications in the context of healthcare.

Complexity also shares many of the ethical stances of critical pedagogy. Like the aforementioned social constructivist discourses, critical pedagogues view epistemology in a participatory way. However, they take a much more ethically-engaged and activist stance in response to this realization. Freire, for example, encourages people not only to take an "epistemological relationship to reality" (Shor, 1993, p. 31), but also to "perceive critically the way they exist in the world", and to "see the world not as a static reality but as a reality in the process of transformation" (Aronowitz, 1993, p. 11).

Critical pedagogy focuses on the role of power and how it structures possibilities for participation and identity in formal education and other institutions. Giroux writes,

> [Critical] pedagogy…signals how questions of audience, voice, power, and evaluation actively work to construct particular relations between teachers and students, institutions and society, and classrooms and communities…Pedagogy in the more critical sense illuminates the relationship among knowledge, authority, and power. (1994, p. 29-30)
>
> At the very least, radical pedagogical work proposes that education is a form of political intervention in the world and is capable of creating possibilities for social transformation…The fundamental challenge

> facing progressive educators within the current age of neoliberalism is to provide the conditions for students to address how knowledge is related to the power of both self-definition and social agency. (2001, xxvii)

Many complexivist thinkers take a similarly critical and engaged ethical stance. Osberg (2005), for example, asserts that education which takes complexity seriously should be

> a practice which always complicates the scene, unsettles the doings and understandings of others, in order to keep open a space of difference and otherness—a space of radical contingency—which is supportive of the emergence of each and every person as a unique and irreplaceable being. (pp. 82-83)

Davis and Sumara (2006) emphasize educators' (and others') inevitable participation in the world, a world that their knowledge and action helps to bring forth:

> Complexity suggested that rather than standing back from the world, we must get involved (and acknowledge our implication/complicity) in the unfolding of the cosmos. (Davis & Sumara, 2006, p. 16)

Once again, however, there is a difference between complexity and the critical social constructivist account offered by critical pedagogy. While critical pedagogy focuses solely on socio-cultural issues and the relationships between individual persons and social collectives, complexity opens to biology and the more-than-human world. From a complexivist standpoint, we (individually and collectively) are participating not only in the formation of social systems but also in the unfolding of biological systems, evolution and the biosphere. The 'natural' world is not merely an inert, unchanging and homogenous backdrop to the dynamic workings of human culture. Whether we like it or not, we are as enmeshed in biology and ecology as we are in culture, and we are ethically responsible for our actions, knowledge and relationships in those areas as well. Given this understanding of ethics, it should not be surprising that complexivists have drawn upon ecological discourses such as ecosophy and ecosprituality, which many regard as an ethical companion to complexity science's ontology (Capra, 2002, p. 214).

Furthermore, complexity's ethical development has not been limited to the philosophical realm. A number of complexivist thinkers in education have articulated concrete and ethically-minded principles for classroom practice. Indeed, many parallels can be drawn between these democratic, participatory principles and those associated with critical pedagogues: Both complexity and critical pedagogy value diversity and commonality, advocate a decentralization of power, and involve students actively in creating knowledge rather than imposing predetermined curricular outcomes.

The first parallel concerns the balance between diversity and commonality in education. In critical pedagogy, this can be seen in Freire's idea of a 'culture circle', in which it is crucial both to articulate diverse and previously silenced students' knowledge and to focus this activity on the achievement of a common goal (Stevens, n.d., Culture Circle). It is also evident in the middle path Giroux takes between modernism's denial of difference and postmodernism's endless celebration of difference; Giroux argues that we need to both affirm diversity while still finding ways to articulate shared goals and values (Stevens, n.d., Henry Giroux).

The first of Davis and Sumara's (2006) three paired conditions for the emergence of complex, learning classrooms describes a similar tension between diversity and commonality (though they use the word 'redundancy' instead of commonality). In their parlance, diversity gives a group a wide range of possibilities for thinking and acting, while redundancy refers to the common ground needed for individuals to interact and appreciate each other's diversity (p. 138). Redundancy also tends to make teams more robust, since they can be more flexible in the roles they play and compensate for one another's lapses (p. 138).

The second parallel is about power; both critical pedagogues and complexivist educators advocate decentralizing power in classrooms, allowing students to play a more active role in an evolving collective curriculum. Such decentralization can be seen in Freire's rejection of the hierarchical "banking" approach to education, which positions the teacher as the central authority who transmits knowledge to students in a unidirectional manner. Instead, Freire developed a "dialogical" approach to education, in which all teach and learn, communication is open and multi-directional, and students' knowledge and experiences can be articulated (Stevens, n.d. Dialogical Method).

Educators influenced by complexity also challenge teacher-centric, control-oriented education (Doll, 2003, p. 167). Indeed, decentralized control is another of Davis and Sumara's (2006) conditions. In a complexivist classroom, the teacher may play a different role than students, but is not 'in charge' in the traditional sense. Curriculum and outcomes cannot be strictly controlled of predicted in advance;

instead they emerge through shared projects, collective decisions and other forms of interaction among students, teachers and their diverse ideas (p. 145).

Finally, both critical pedagogues and complexivist educators understand curriculum not in terms of achieving linear, predictable outcomes, but rather in terms of expanding the space of the possible. As stated previously, critical pedagogy opposed the idea of transmitting predetermined knowledge to passive students. Rather, the aim is for students and teachers to create new knowledge, through dialogue grounded in their own, often-silenced experiences.

Among complexivist educators, Doll (1993), Davis (2004), Karpiak (2000) and Osberg (2005) have articulated similar ideas. Education is about creating conditions for the emergence of individual and collective learning, not perpetuating entrenched beliefs or converging on a preset truth (Davis, 2004, p. 184).

In matters of epistemology, ethics, politics and education, therefore, complexity—at least as many educational theorists have developed it—bears little resemblance to ‘hard science’ or traditional “banking” approaches to education. The preceding brief examination of the complexivist ideas’ implications in these areas is important because it will form a basis for several discussions in later chapters. As we shall see, issues relating to ethics, politics, epistemology and education—for example, equality in health teams, my own ethical complicity in the research, and the tensions inherent in formal education—appear a number of times in what follows.

3.0 Chapter 3: Planning

3.1 Initial Collaboration

This chapter deals with practical aspects of my evolving collaboration with the organizers of INTD 410, and the plans we collectively made to change the course curriculum, including readings, activities and various conceptual tools, such as a "checklist" developed to help students reflect on their teams' functioning. As described in the Data Gathering and Analysis section, sound recordings were not made during this cycle, and so 'participant voice' is not heard directly, but rather mediated through my reportage.

The focus in this cycle is largely on ideas. In the next chapter, I describe how the complexity ideas and the ideas from the existing course curriculum actually come together and mutually influence one another. In this chapter, I focus on how I and the course coordinator, and then all of the rest of the course organizers, collectively made the plan to carry out that action.

As discussed in the Chapter 1 ('Trigger'), the collaboration that is the focus of this research began with a meeting between myself and two of the course's 'organizers', specifically, the course coordinator and one member of the IPI committee. At that meeting, we agreed that there were several areas in which we might be able to collaborate—that is, to productively combine what I knew about the professional knowledge, complexity science and other new theories of learning, with what they knew about various healthcare disciplines, teamwork skills and their experience in teaching the course. An additional goal the organizers had for the curriculum was to make the manual more clear, user-friendly and engaging for students. With its focus on teams and interaction, INTD 410 was quite different from typical undergraduate health courses and in past years some students had apparently expressed disappointment or confusion about the course and its goals.

The general plan for me was to review the course manual in order to look for opportunities for action and change, and then present my findings for discussion at the annual meeting for all of the course organizers from the various faculties that oversaw the course. At that time, they would offer feedback on proposed changes and give provisional approval to those changes that they felt were justified. Since the annual meeting took place several months before the final curriculum for that year was established (and student and facilitator versions of the course manual were printed), there would be sufficient time after the meeting to further develop new ideas. Furthermore, updated drafts of new curricular materials would be shared with all the organizers by email before and after the annual meeting, in order to solicit additional feedback.

That was, however, only a very general plan, and so in the months leading up to the annual meeting, we decided that I would meet periodically with the course coordinator to 'brainstorm' ideas for changes and get guidance and feedback on the thinking and writing I was doing. The coordinator gave me a copy of the facilitators' version of the manual, which included all the pages in the student manual, plus additional background information to guide classroom activities. I then set to work.

One of my first tasks was to put together a number of new, accessible readings on teamwork for students and facilitators, readings that drew upon new complexivist ideas of learning and interdisciplinarity. Sharing these readings with the course coordinator also ensured that she gained a deeper understanding of the ideas we were seeking to introduce. In effect, we were sharing our knowledge; I was learning about the course and its existing intellectual influences and she was learning about complexity.

The readings we agreed to submit to the other organizers at the annual meeting included 1) a general introduction to complexity in healthcare titled 'Applying Complexity Science to Health and Healthcare' (Center for the Study of Healthcare Management, 2003); and 2) Chapters 2 and 9 from Surowiecki's very accessible and complexity-compatible book, *The Wisdom of Crowds* (2004). The educational writings on complexity and the conditions for collective learning that I shared with the coordinator were deemed too long and not directly applicable to health teams. Instead, we agreed that I would write a short introduction to complexity science and Davis' (2004) conditions for complex emergence in human collectives.

My next task, in anticipation of the annual meeting, was to critically examine the existing course manual, to see where complexivist insights could be integrated and, more generally, to identify any areas of the manual that I thought required clarification, change or improvement. Two general areas of the manual would be examined. The first dealt with the first two three hour classes, in which students learned about other disciplines and interdisciplinary teamwork skills. The second encompassed most of the rest of the course and involved the complex healthcare case studies that the student teams would work through. Both areas included extensive readings, checklists, questions to answer, and so on.

Finally, I had to prepare a brief oral presentation, in which I would introduce myself, the planned research's methodology and direction, a brief introduction to complexity and the new readings the coordinator and I had selected for them peruse, and my initial observations concerning the course manual—including both general suggestions for improving it and, more specifically, ways in which complexivist ideas could be integrated into the course curriculum.

3.2 Widening Circle of Participation: The Annual Meeting

Every year, before the beginning of the academic year and five months before INTD 410 actually begins, the course organizers meet to reflect on the previous year and plan curriculum changes and research activities for the next year. This group of organizers includes the course coordinator and representatives from the various healthcare faculties that have students in the course (Medicine & Dentistry, Nursing, Pharmacy & Pharmaceutical Sciences, Rehabilitation Medicine, and Physical Education & Recreation).

Before the meeting, the course coordinator had sent out an email that introduced me and informed the other organizers that I would be presenting to them at the meeting and discussing the new ideas. The email also had the aforementioned readings attached, so that the organizers could get a sense of complexity science and its potential relevance for interdisciplinary healthcare teams.

After the organizers had discussed a great deal of other business relating to the course, I got my turn to speak. I began by briefly introducing myself and discussing the complexivist ideas and readings, including the concept of nested systems, something that I felt was quite applicable to healthcare. Then I talked about action research methodologies and how I hoped to work with them, and then later the course facilitators, to combine what I knew about complexity and education with what they knew about their course and interdisciplinary health teams—with a view to creating new knowledge and practices in the context of the course and perhaps beyond. I was not sure if they really understood all the ramifications of this methodology (such as its non-objectivist, participatory epistemology) but they did not query or object to it in any way at that time.

During these discussions, I was careful to emphasize that although I had studied the manual and related documents closely, I was only beginning to learn about the course. Unlike them, I had never actually acted as a class facilitator nor practiced in an interdisciplinary health setting. I stressed that the observations and suggestions I would be making (based on my own readings and interactions with the course coordinator) should therefore be taken 'with a grain of salt' and treated more as a starting point for discussion than a conclusion.

After offering that caveat, I shared my observations on the course manual and areas that needed improvement. First, I noted that there were a lot of resources on teamwork and that their number and diversity might actually be confusing to students. First, there was a short reading on interdisciplinary health teamwork from Ray (1998) and a very extensive, detailed one from Drinka and Clarke (2000). Then there were four 2-3 page handouts on team development, processes and competencies. Each of these resources offered a different—though somewhat overlapping—schema or checklist to ensure proper team functioning.

The second observation I offered dealt with students' confusion about the goals of the course. Part of the reason, I suggested, might have to do with students having difficulty 'switching gears' from traditional healthcare courses, in which individual mastery or internalization of pre-established content is the goal, to INTD 410, in which interpersonal interaction and overall team knowledge is the focus.

In relation to the first observation, I made a number of suggestions. First, I suggested adding the Surowiecki (2004) reading to the manual. The primary reason to include it was that it did an excellent job of illustrating the value of conceptual and professional diversity in teams—and inculcating a respect for disciplinary diversity was a key goal of the course. One weakness of the Surowiecki reading, I pointed out, was that it did not explicitly address healthcare issues. I also suggested that, if they chose to include the Surowiecki reading, they should substitute it for one of the other articles, rather than simply adding it to the large number of existing resources.

The second suggestion I made was that—whether they decided to change the readings or not—it would be useful to students to put together a consolidated teamwork checklist that summarized all the various readings and resources. The goal would be to make something very clear that students could refer to and use as a checklist during the various patient scenarios. I noted that in my experience in developing career education materials for Ontario teachers, this sort of concise and easy-to-use documents got a lot of use. Further, I thought such a checklist would provide students with a common reference point for discussing complex team issues.

The final suggestion I made in relation to the first observation was to infuse the proposed checklist with insights from complexity science. In most respects, doing so would be relatively straight-forward, since the complexivist ideas about collective learning, such as Davis' (2004) conditions, were quite compatible with the existing teamwork checklists. Furthermore, I argued, certain aspects of the complexivist ideas might extend the existing checklists' ideas in fruitful ways. For example, complexity offered an explicit account of how collectives such as teams can become 'more than the sum of their parts' when they interact and recursively elaborate on one another's ideas. This was something that the existing resources often assumed but never explicitly explained.

The second observation I made above concerned students' confusion about the goals of the course and the difficulty of 'switching gears' from traditional healthcare courses, in which individual mastery of pre-established content is the goal, to INTD 410, in which interpersonal interaction and overall team knowledge is the focus. As a response to this observation, I suggested making INTD 410's distinctive focus on interaction and team learning explicit in the course's goals. That is, the course goals could emphasize that the goal of individuals should *not* be to master pre-given content or understand everything that people in other disciplines do; rather, individuals should focus on evolving team knowledge and learn to adapt their actions and knowledge in relation to those of others on the team.

To illustrate what I meant, I used a metaphor from team sports. Students from each discipline came to the course knowing how to play a certain 'position' (for example, 'defence'). Their goal in the course was not, as individuals, to master additional content, (for example, how to play other positions like 'offence'). Instead, their aim should be to learn how to play *with* people from those other positions. By coordinating their (still specialized) knowledge, they could make the team as a whole more effective or 'intelligent'. Of course, individual learning of skills like communication and flexibility was involved in this process, but learning by the team as a whole was at least as important a focus.

I also pointed out that this approach to teamwork was already implicit in several existing activities, such as the 'Professional Roles and Scope of Practice' activity, in which students are asked to consider how they might work with other disciplines they have just been introduced to. The advantage of making the course's distinct focus explicit, though, would be that students would be less likely to interpret their experience in a traditional, individual-focused educational framework; instead, they might open to other ways of learning.

The organizers responded very well to the practical suggestions. Several observed how valuable it was to have someone join their group and look at the curriculum they had grown accustomed to "through new eyes". One organizer really liked the idea of a consolidated teamwork checklist that summarized all the various readings and resources related to teamwork. She further suggested the checklist might be directly linked to student activities and evaluations throughout the course. Another observed that the new reading by Surowiecki (2004) would be very effective at dislodging hierarchical assumptions about the relations between disciplines and their differing sorts of knowledge. Yet another noted that students often assumed the course was "not important", or that they had "already taken this". The new readings would be especially good, he felt, if they "shocked" students into thinking there was something new for them to learn in the course.

However, some of the more theoretically-oriented ideas, such as infusing the consolidated checklist with complexivist insights or making the course's distinct focus on teams rather than individuals, were less universally acclaimed. Several organizers did speak in favour of adding complexivist ideas, but no one addressed the possibility of changing the course's goals. My feeling at the time was that several had not read the materials we sent out before the meeting or did not fully understand the some of the theoretical ideas being introduced.

One organizer asked a difficult question, concerning whether or not there had been any empirical validation of complexity science. My response was that empirical studies had probably been carried out by natural and social scientists using complexity, but that I was not aware of any quantitative empirical 'testing' of the ideas concerning collective learning. I further pointed out that the sort of validation they were accustomed to—for example, in lab-like, controlled conditions—was probably unattainable in the context of team learning. Finally, I noted that many of the ideas about teamwork they were currently using were not empirically verified either. The individual who asked the question did not pursue it any further, and I was unsure if he had been satisfied by my answer. (Note: This organizer's question is reflected upon further in Chapter 5.)

In any case, a number of decisions were made by the group concerning the suggestions for change. First, they tentatively approved a plan to replace the existing, very detailed reading by Drinka and Clarke (2000) with the new Surowiecki (2004) chapters and perhaps one other article on the professional relations in healthcare selected by the course coordinator. However, before final approval of these changes, the coordinator would re-send the articles to the other organizers to ensure that each had a chance to review them carefully.

Second, we were given approval to go ahead with the consolidated teamwork checklist that summarized all the various readings and resources. Further they agreed that this checklist should be infused with complexity insights. In particular, the group thought it was important to use the ideas from complexity to better explain what was different about working in teams, that is, what happened when teams really 'gelled' and emerged as more than the sum of their parts. Again, drafts of this document would be sent out to the organizers by email for feedback and final approval.

Third, the organizers thought that it would be a good idea to look at the various activities and evaluation materials, to investigate whether they could be linked to the consolidated teamwork checklist. Unfortunately, this investigation was not made any particular person's responsibility. Instead, the organizers would be sent a draft of the consolidated checklist and asked to give feedback on how it might be incorporated into the activities and evaluations.

However, my suggestion to change the goals of the course, in order to explicitly shift the focus from individual content mastery to team-level learning, was not taken up. In fact, I did not notice this omission until later, when I was reviewing my notes from the meeting.

In any case, before getting to work on the proposed consolidated teamwork checklist, I met with my academic supervisor. I discussed what had happened at the meeting and the changes the group had agreed upon. He stressed the importance of making the complexivist ideas explicit and putting them "up front", as a framework for interpreting the other readings, rather than simply using them to provide yet another "after the fact" summary of teamwork principles. This balance between the complexivist ideas, on the one hand, and existing course content and participants' conceptions, on the other, was something that I would have to negotiate throughout the research.

4.0 Chapter 4: Action and Observation

4.1 The Ideas

This chapter deals with creation of the consolidated teamwork checklist, in which I, with supervision and feedback from the organizers, compare and integrate the existing course literature and resources with complexivist ideas. As we shall see, this interaction of ideas led to a more general exploration of the theoretical orientations underlying both sets of ideas. It also marked the beginning of the generation of new ideas about disciplinary knowledge and interdisciplinary integration—ideas that, as we shall see, evolve throughout the course of this dissertation.

The first section describes the initial stages of the creation of the consolidated teamwork checklist, in which I carefully examined the existing course literature and resources, as well as the more general theoretical literature that it reflected. The second section briefly reviews existing writing on complexity and healthcare generally. In the third, much longer section, the true interaction of ideas takes place, as I discuss the ways in which complexity may be used to support, elaborate on, and challenge the philosophical underpinnings of existing literature on interdisciplinary health teams. Finally, in the fourth section, I describe the actual writing of the consolidated teamwork checklist and my attempts to bring together and honour both the existing course content and the various complexivist insights.

4.11 Existing Literature and Resources

On a practical level, INTD 410's existing readings, handouts and checklists on interdisciplinary health teamwork seemed to have much in common with each other and with the complexivist ideas. For example, all stressed the importance of respecting diversity, facilitating communication or interaction, and establishing rules to enable the open discussion of ideas.

However, upon closer examination, subtle but important theoretical divergences revealed themselves—both between complexity and the existing curriculum and within the existing curriculum itself—concerning the nature of disciplinary knowledge and how it might be integrated. Further, these divergences had some significant implications for understanding and nurturing interdisciplinary teamwork on a practical level. That is, the various ideas' theoretical assumptions about the relationship between different kinds of disciplinary knowledge and their integration led to different interpretations of the practical conditions for teamwork mentioned above.

In this section, I discuss theoretical divergences I discovered *within* current literature on disciplinary knowledge and interdisciplinary integration in the context of health teams, drawing upon both the existing course readings (Ray, 1998; Drinka & Clarke, 2000) and a selection of other writers that additional research led me to. As we shall see, existing literature falls into two general strands—practical approaches and socio-cultural approaches—both of which hold that disciplinary knowledge differences can be overcome through consensus. In the following subsection(s), I compare and contrast these approaches with a complexivist approach, demonstrating how complexity supports, elaborates on, and challenges this literature in several ways.

During the course of my research in preparing the consolidated teamwork checklist, I began to notice that much of the current literature on the topic tended to approach professional differences in one of two ways. Some authors attributed problems in the relationships among the members of teams to very practical issues like personality differences and lack of communication. Other, more theoretically sophisticated writings pointed to sociocultural factors and professional socialization, recognizing the possibility of deeper differences in health professionals' knowledge. Both approaches, however, assumed that interdisciplinary health teams can and should overcome their professional differences by getting team members to think more alike and achieve consensus. In what follows, I provide several illustrative examples of these two approaches from current literature, including existing course readings by Ray (1998) and Drinka and Clarke (2000).

Authors who take the first approach attribute problems in relationships among the professionals to practical factors like personality clashes, insufficient communication and differing clinical foci. As a result, their prescriptions for 'making teams work' are directed towards mitigating these factors and thus allowing teams to achieve consensus in their decision-making. These authors do not generally contemplate the possibility of deeper epistemological differences between professions' knowledge bases, differences that may problematize the possibility of consensus.

Molyneux (2001), for instance, identifies three themes for interprofessional teamworking based on interviews with the members on one health team judged to be successful: 1) having team members who are confident in their own disciplines but also flexible and sharing in their working relationships; 2) ensuring regular and frequent communication between team members; and 3) developing co-operative, non-hierarchical team structures. Poulton and West (1999), based on a much larger data sample, stress the importance of personal participation, commitment and collaboration, and link these factors to the development of clear and shared team objectives. Boon et al. (2004) stress that integrative, interdisciplinary health care should be characterized by mutual respect and consensus-based decision-making.

Ray (1998) also discusses potential problems presented by personal factors and calls for team members from various disciplines to sublimate their ego and operate with the broader good in mind when working within health teams (p. 1372). Unlike the previous authors, he explicitly raises the issue of disciplinary differences, offering up the image of professional silos and stressing the need to move to less isolating images such as that of boxes with blurred boundaries (p. 1371). However, he characterizes these professional differences as resulting from different clinical foci and expectations, and not from any deeper epistemological incongruities (p. 1372). Indeed, he believes that interdisciplinary teams ought best to work on the basis of consensus (p. 1371).

More recently, this 'practical' approach has been criticized by authors schooled in sociocultural theories for not acknowledging the deeper epistemological discrepancies that arise between people socialized in different disciplines. Drinka and Clarke (2002), whose views I return to shortly, put it thus:

> In IHCT [interdisciplinary health care teams], the dimensions of communication most often discussed relate to issues involving personality clashes, role overlap and conflict, and the effective use of sharing of clinically important information. Absent is an examination of underlying problems with communication based on the professional differences among health care providers, including how they acquired particular values over the course of their education and subsequent clinical work experience...
> For example, physicians tend to approach patients within a predominantly biomedical model, emphasizing "objective" information from laboratory tests as a means to focus on increasingly narrow interpretations of the patient's "problem." Most nurses, however, tend to have a much broader view of the "patient as person," which includes his of her interpretations of the meaning of the illness and its significance for everyday living. This more holistic approach to the patient's problem embodies more qualitative dimensions, in contrast with the medical emphasis on quantitative, "factual" data as sufficient to understanding the problem. (p. 63)

Authors taking this second approach recognize the possibility of deep differences among professionals' knowledge and use sociocultural theoretical tools to explicate these differences. However, most also claim that these differences can be reconciled and that interdisciplinary teams can and should learn to think more alike and function on the basis of consensus.

Beattie (1995), for example, uses the anthropological metaphor of tribes to analyze health profession boundaries, arguing that each profession has its own explanatory framework or 'cultural bias' (p. 20). D'Amour (2005) et al. assert that each discipline develops theoretical frameworks that are often rigidly circumscribed, and conclude that organizational theory and sociology offer the best models for understanding interprofessional collaboration (p. 127). McKee (2003), based on Schon and Rein's (1994) pioneering work on 'frame reflection', writes about how disciplines structure our experience for us, giving our world coherence and making other's contrasting worlds seem incoherent (pp. 403, 404). Significantly, McKee also claims that the key to effective teamwork is learning to reflect explicitly on our theoretical frames and "help others see what we see" (p. 406).

Hall (2005) provides a more thorough socio-historical analysis of the potential conflicts among different kinds of professional knowledge. She writes that, due to their different education and socialization, professions develop differing "cognitive maps"; as a result, they can look at the same information and yet see very different things. Interwoven within these cognitive maps are value differences that often go unspoken—for instance, how physicians traditionally focus on physiological outcomes, while social workers may place more emphasis on relationships and patient self-determination.

According to Hall, these differences arise as a result of social and political tensions. Based on the work of several well-known social theorists, she describes how professional expertise has long been used as an ideological tool for power and control; for instance, one profession may seek to heighten the contrast between itself and other rival professions in order to expand its authority.

The solution to the challenge of differing professional outlooks, Hall (2005) writes, is to "provide opportunities for team members to understand each other's cognitive maps" (p. 190). Professionals must also learn to make their values more apparent to one another. Although she does not explicitly invoke the goal of consensus, Hall's solution resembles those of previous authors: Interdisciplinary teams can be made to work better by having members share their knowledge with one another so that professional boundaries are blurred and members think more alike.

Perhaps the most sophisticated and sustained treatment of interdisciplinary health teams comes from Drinka and Clarke (2000). Like Hall (2005), they see professional differences as taking two forms: Differences between team members' "cognitive maps" (their professional knowledge and how they use it) and differences between their "value maps" (which seem to represent not only their ethical orientations, but also their identity and internalized professional norms) (pp. 68, 86).[1]

To overcome differences in the former, members must "incorporate the cognitive maps of others into their own framing of 'what is the problem' and 'how can it be solved'" (p. 88). This requires "making the internal workings of each profession apparent and understandable in nontechnical language" (p. 98). In this respect, Drinka and Clarke's (2000) account resembles those of Hall (2005) and the other authors: Interdisciplinary teams are thought to work better when members begin to understand each other's knowledge and thus think more alike.

In their treatment of value differences, however, Drinka and Clarke (2000) take a different approach. They write that truly reflective practitioners make a "commitment within relativism" (p. 92). This means that, on the one hand, they understand that "all facts and theories are human constructs" and respect the different but complementary perspectives offered by other disciplines; on the other, reflective practitioners make a commitment to "adhere to a particular school of thought or to stand up for a particular value" (p. 92).

This latter solution is interesting because it does not rely on reducing the differences between professions. Instead, it encourages professionals to see their particular values in a larger context, as important and worth pursuing, but at the same time as not being the 'whole story'. Health professionals are thus not so much asked to comprehend each other's values, as to respect each of those values and understand that complex health problems in the 'real world' may involve many different kinds of values.

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[1] Interestingly, there is an unresolved tension in Drinka and Clarke's book. At some points, team members' values are treated narrowly, as ethical perspectives within a primarily cognitive or factual situation (much of chap. 5). At other times, they are treated more broadly, as playing a key role in what constitutes 'facts' in the first place (chap. 4). Perhaps this ambiguity reflects the authors' differing philosophical commitments.

A final intriguing aspect of Drinka and Clarke's (2000) account is their brief description of how interdisciplinary health teams can be 'more than the sum of their parts'—something that is often assumed, but never explicitly spelled out, by other authors.

> …a clinical team is much more than the simple sum of individuals working together as a group: It is a complex entity of providers who are trained in different fields or professions, and who use different tools, frameworks, and approaches to the patient. As the team develops more experience in working together, transformations occur within members that reflect an internal change in the thought process and normative assumptions on which they base their behaviour and practice. (pp. 85-86)

Unfortunately, they do not develop this idea any further. Instead, they focus on explaining how individuals' identities are influenced by their participation within teams—leaving aside any consideration of how these individual transformations might lead to the emergence of something greater at the level of the team.

To summarize then, the course resources on interdisciplinary health teams and the more general theoretical literature that they reflected, put forward several significant ideas. First, a number of authors believe the primary barriers to interdisciplinary teamwork have to do with practical factors like personality conflicts and insufficient communication, rather than deeper epistemological incongruities in different professions' knowledge(s). Second, even those authors who take a more sociocultural approach and recognize differences in professions' "cognitive maps" seem to believe that these differences can ultimately be reconciled through a sharing of knowledge among team members. Third, all seem to assume that the goal of health teams should be to think more alike and thus achieve consensus (with the possible exception of Drinka and Clarke's treatment of professional value differences).

Finally, while many authors seem to assume that interdisciplinary teams can become 'more than the sum of their parts' and offer better solutions than healthcare professionals working independently, none but Drinka and Clarke address this phenomenon explicitly, and even they offer little concrete guidance as to how exactly this transformation might come about.

Unfortunately, Cooper, Braye and Geyer do not develop these promising ideas very fully or radically. For instance, the concepts of self-organization and paradox are linked to the idea that student learning is "constructed" rather than "engineered" (p. 184), something that few educational theorists today would dispute. Further, the link between complexity and interdisciplinarity, or interprofessionalism, is not made as deeply as it could be. The authors provide a convincing argument why complexity, with its emphasis on connectivity, diversity and unpredictable emergence, is better suited to higher education in general than more traditional, linear models. But they do not make use of prominent literature that makes fundamental links between interdisciplinarity and complexity—for example, Newell (2001a) and Klein (2004). Finally, although they argue that complexity should inform interprofessional course development and evaluation, they do not contemplate using it explicitly in student learning materials.

4.13 What Complexity Can Add to the Existing Literature

The relationship between complexity science and interdisciplinary health teams was therefore something that was only just beginning to be explored. This meant that our research, by bringing together ideas from these differing areas, had the potential to create new knowledge that could be of use to others in fields of healthcare and complexity. In this section, I describe insights that were derived from the interaction of these ideas.

More specifically, I argue that complexity can be used to:

1) *support* existing socio-cultural analyses of disciplinary differences;

2) *elaborate* significantly on those analyses by

    a) offering an explicit account of how teams can become 'more than the sum of their parts'

    b) articulating another, overlooked source of disciplinary difference; and

3) *challenge* existing assumptions about the possibility and desirability of achieving 'consensus' in interdisciplinary health teams.

Supporting

As discussed above, a crucial insight of recent socio-cultural analyses of healthcare is their recognition of deep epistemological differences between professions, rooted in their differing histories, education systems, socialization processes, power relations, and class and gender politics. Similar observations

As we shall see in the sections that follow, the complexivist ideas developed during the current dissertation research can be used to support, elaborate on, and challenge existing literature on interdisciplinary teamwork. Before turning to these ideas, however, I will provide a brief summary of other current research initiatives and thinking in the area of complexity and healthcare.

4.12 Complexity in Healthcare Literature

A number of authors and organizations have started the work of developing complexity science within the context of health care and health care education. Researchers associated with the Plexus Institute (http://plexusinstitute.org), based in the United States, have explored the implications of complexity for health care at multiple levels—from the cells and organs to health care organizations and leadership issues. For example, Begun, Dooley and Zimmerman (2003), who have links to the Plexus Institute, have argued that healthcare organizations should be seen as complex adaptive systems.

In the United Kingdom, Kernick (2004) has edited and contributed several articles to an extensive book on complexity science and its importance for healthcare policy and organization. In the same book, Price (2004) has written about how complexity can be used to guide healthcare education.

Only one group, though, has applied complexity science to the education of interdisciplinary health teams specifically. Based on research activities at the University of Liverpool, Cooper, Braye and Geyer (2004) have suggested that complexity can provide a much needed theoretical framework for the development and evaluation of interprofessional health education (p. 181, 187). They argue that interprofessional education (IPE) does not does not fit easily into traditional scientific disciplinary approaches to learning and knowledge which emphasize linear, predictable learning outcomes. Instead, IPE requires a more flexible, non-linear curricular approach based on the Tosey's (2002) complexivist concepts of self-organization, paradox, emergence, and edge of chaos (Cooper et al., 2004, p. 185). Further, IPE needs to adopt a multilevel approach, considering both individual learners in their cognitive and emotional aspects, and the larger scale "macro-systems" (university, community and social groups) in which IPE takes place (p. 186).

about professional incommensurabilities had been made earlier in other contexts by well-known organizational thinker Schon and coauthor Rein in *Frame Reflection: Toward the Resolution of Intractable Policy Controversies* (1994) as well as by Petrie in his classic article 'Do You See What I See? The Epistemology of Interdisciplinary Enquiry' (1986):

> [D]ifferent disciplines do have different cognitive maps and…these maps may well get in the way of successful interdisciplinary inquiry… disciplinary categories of observation are theory and discipline relative. Quite literally, two opposing disciplinarians can look at the same thing and not see the same thing. (p. 121)

As we saw above, Petrie's notion of disciplines' conflicting "conceptual maps" has been taken up by several writers in the area of interdisciplinary healthcare, including Drinka and Clarke (2000).[2]

This socio-cultural understanding of professional differences can be supported by the complexivist ideas I developed in Chapter 2. In other writings, I have argued that professional disciplines can be understood as complex systems, and clearly possesses many of the key qualities associated with such systems: learning, self-organization, adaptation and—most importantly in the current context—incommensurability (McMurtry, 2005). A brief summary of that argument is provided below.

First, professional areas like medicine, engineering, nursing, education and many skilled trades, can be seen as collective learners and not just as a collection of learners. Each has a coherent identity that has evolved over many years (even centuries), despite a regular turnover in its members. Each has developed unique and sophisticated tools, vocabularies and patterns of interaction to deal with the day-to-day problems it faces. One relatively well-known example is the legal profession, with its highly specialized vocabulary, procedural formalities, adversarial orientation and analytic forms of argumentation.

Furthermore, the knowledge present in such professional systems does not simply reside in individual participants' heads. Instead, it is distributed across the system and dynamically embodied in people, practices, relations and artefacts. For instance, the solution to even a single criminal case (that is, assigning guilt or innocence) emerges not from any one person's knowledge but rather from a complex and unpredictable interaction of prosecutors, defense lawyers, judges, juries and clerks, as well as vast stores of written precedents in case books and historically accumulated formalities of behaviour. As Lave and Wenger (1991) assert, knowledge exists not so much in any given individual as in the relations among individuals and in the organization of the community of practice within which they act (pp. 51, 94).

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[2] Interestingly, like the social-cultural thinkers in healthcare they prefigured, both Petrie (1986) and Schon & Rein (1994) argue that differing conceptual maps can and should be reconciled through a sharing of disciplinary knowledge, with the aim of achieving consensus.

Second, professional disciplines are adaptive and self-organizing, in the sense that they have evolved over time in relation to specific contexts and through the dynamic interactions of their particular practitioners. Again, the legal system provides an excellent illustration of how complexity's concepts of adaptation and self-organization play out when applied to professional disciplines.

In terms of adaptation to specific historical contexts, Canada's common law has its roots in medieval Anglo-Saxon society. Its orientation towards individual property rights (especially land) and its tendency to measure all harms in monetary or exchange terms (for example, two silver coins being considered appropriate compensation for a severed left hand) seem to have begun at that time. Since then, the law has had to adapt to innumerable new dilemmas, including corporate law (which involved inventing a fictional legal "person" for financial and liability reasons) and, more recently, intellectual property, environmental harms, and biomedical issues such as cloning. The legal system has also been shaped by social conventions and government legislation that gives it near monopoly power to resolve all disputes. To a certain extent, it is embedded in the larger economic system and its disparities: Wealthy people and large corporations can 'tip the scales' in their favour by hiring more and better lawyers than their less affluent opponents.

However, it is important to stress that such adaptation to contexts is *conditioned*, but not *determined* by such external influences. As in all complex systems, the self-organizing, dynamic internal structure of the system itself has played a role as well. For example, the legal system often resists external pressures to change and assimilates new dilemmas within its existing framework (for example, the way non-material ideas like patents were analogically equated with physical property—thus "intellectual property"). And hard-fought cases can often help to bring significant change to the very social, economic and political structures in which legal system is embedded (recent same sex marriage rulings here in Canada, for instance, provide an example of how the legal system can bring about changes that a majority of people might not be ready to support). Similar but different self-organizing principles could be identified in other professional disciplines as well.

Finally, professional disciplines offer largely incommensurable ways of thinking and acting. One discipline cannot be simply be translated or reduced into the terms of another area; nor can different disciplines be entirely reduced to a common underlying phenomenon. This is the point Anderson (1972) made in Chapter 2, in the context of science disciplines, asserting that none was more "fundamental" than any other.

Elaborating/Extending

The complexivist ideas developed in Chapter 2 can also be used to extend, or elaborate on, the existing course approaches and wider literature. One way in which they do so is by offering an explicit account of how teams can become 'more than the sum of their parts'—something that, as we saw, was often assumed but never explained in the existing healthcare literature.

As described in Chapter 2, a complex system is constituted not only by the sum of its components, but also by the dynamic relationships between these components (Cilliers, 1998, p. 2). It thus embodies possibilities exceeding the sum of its components, possibilities that emerge at the level of the system as a whole. This insight applies to not only organisms and their component cells, but also human social collectives and their component individuals. It can also be used to understand how an interdisciplinary health team might emerge as 'more than the sum of its parts' and offer better solutions than those same health professionals working independently.

Consider, for example, a small team made up of a physician, pharmacist and social worker. They a have a patient with an ulcer, an alcohol addiction, and a social context conducive to heavy drinking. Working together, they can not only provide a wider range of health services, but also coordinate care on an on-going basis and build on one another's ideas. For instance, after hearing about the patient's behaviours and social context, the pharmacist might suggest more appropriate sorts of treatment and medication. Or, after hearing from the doctor and the pharmacist about physiological issues and possible drug side effects, the social worker might be able to direct the patient to more suitable group counselling. The crucial point here is that by developing a relationship, working together and adapting their contributions in relation to one another, team members are able to come up with more and better solutions than they could working independently.

Although many papers have been written on the possible and probable benefits of interdisciplinary health care—see, for example, Nolte & Tremblay (2005) and Meads & Ashcroft (2005)—few if any have explicitly studied the idea of knowledge emerging at the level of the team that exceeds the sum of separate individuals' knowledge. As Bleakley writes, "most commonly applied learning theories in medical education continue to be those that focus upon an isolated individual" (2006, p. 151).

One exception is recent research by Chatalalsingh and Regehr (2006) designed to remedy the lack of studies on how "learning activities might be understood at the level of the team" (p. 35). After studying health teamwork in the peritoneal dialysis unit within a large urban academic health science institute, they describe several ways in which "greater collective understanding" and "better solutions" emerged through team interaction; for instance, by sharing information and insights, team members were able to develop better patient protocols and identify a previously unsuspected drug side effect (Chatalalsingh & Regehr, 2006, p. 34). Significantly, both Bleakley (2006, p. 156) and Chatalalsingh and Regehr (2006, p. 36) highlight the need for new learning theories that look beyond the individual and take into account group level learning in dynamic and complex environments.

There is another, and perhaps more important, way in which complexity can elaborate on existing course resources and the wider socio-cultural literature that they reflect: It identifies an additional source of deep disciplinary differences, or incommensurabilities, rooted in the differing sorts of complex systems studied by health disciplines.

As we have seen, socio-cultural approaches have offered valuable insight into how human relations (gender, class, professional socialization, historical conflict, and so on) have shaped disciplinary knowledge differences or boundaries. Indeed, complexity supports this insight, offering a parallel account of how disciplines themselves can be seen as complex learners that adapt to their unique histories and contexts in self-organizing and incommensurable ways.

However, from a complexivist perspective, such socio-cultural accounts can only tell part of the story because they ignore the role played by the differing complex systems that professionals study and engage with. Recall from Chapter 2 that—unlike the mechanical systems studied by reductionist science—one type of complex, living system can never be collapsed into a mere instance, variation, or elaboration of another; this means that discourses concerned with differing complex phenomena can be simultaneously appropriate to their particular research focuses and incommensurate with one another (Davis & Simmt, 2003, p. 143).

In the context of healthcare, for instance, the different professional paradigms employed by internal medicine physicians, whose foci include biochemistry and pharmacology, and occupational therapists, whose foci include ergonomics and counselling, are not just a function of human relations and intersubjective accord, they are also shaped by the incommensurable phenomena with which professions interact. Indeed, the perspective of healthcare as involving a number of differing complex systems with emergent characteristics—from cells and organs, to the whole person, to physical and social systems—has been articulated by researchers at the Plexus Institute (http://plexusinstitute.org/) and at the University of Arizona's Program in Integrative Medicine (http://www.integrativemedicine.arizona.edu/). However, these researchers do not address the socio-cultural aspects of disciplinarity and interdisciplinarity—that is, they concentrate on the complexity of what is studied, or the 'known', rather than the complexity of the 'knowers'.

To gain a full understanding of disciplinary differences and interdisciplinary integration, then, one must acknowledge both the complexity of knowers (in this case, human beings and disciplinary collectives) and the complexity of the phenomenon 'known' (that is, the systems with which these knowers engage). That which is known can, of course, never be ultimately separated from the knower, but it does have an integrity of its own that is not simply a function of the processes of human knowing. As Davis and Sumara (2006) write, complexity thinking "refuses to collapse phenomena with knowledge of phenomena. These two are inextricably entangled, but not coterminous" (p. 160).

That is not to say that to say that each profession is closing in on the 'one truth', or a 'true' representation of reality, with respect to the particular system(s) they study. That would represent a kind of 'distributed modernist epistemology'. Instead, disciplinary knowledge constitutes one viable way of interacting with the phenomenon in question; as interdisciplinary research expert Newell (2001b) points out, disciplines may not offer universal truth, but they have developed tools and methods that enable them to be productive in relation to the specific portion of the world they have chosen for study (p. 145). Further, many different kinds of knowledge may be viable in relation to a particular living system; for example, both traditional and holistic medicine may be viable ways of engaging with bodily systems.

But the viability of such knowledge is not simply a function of human relations and intersubjective accord. Powerful neurotoxins kill regardless of how many people believe in their health benefits—and act accordingly. At a larger scale, unsustainable agricultural and industrial practices will, in the long run, undermine the viability of human-ecosystem relationships (eliminating either the ecosystem, or the humans, or both). Interactions between people and other complex systems are thus constrained, but not determined by, the systems.

Insights from complexity science can therefore be used not only to *support* socio-cultural analyses of disciplinary differences and interdisciplinary integration, but also to suggest several ways in which these accounts should be *extended*. As we have seen, one way is by offering an explicit account of how teams can become 'more than the sum of their parts' and another is by locating a crucial but overlooked source of disciplinary difference in healthcare. In the next sub-section, I discuss how complexity science *challenges* existing assumptions about the possibility and desirability of achieving 'consensus' in interdisciplinary health teams.

Challenging

As previously noted, the course readings and the wider literature espoused either a practical or socio-cultural approach to disciplinary differences. Both approaches, however, assumed that these differences could be overcome through consensus[3] or getting team members to think more alike and learn each other's paradigms (see, for example, Boon et al., 2004; Ray, 1998; Drinka & Clarke, 2000; Hall, 2005).

But if, as I have argued, different kinds of professional knowledge are doubly incommensurable, then is this sort of consensus or 'thinking alike' truly possible? Can people from different disciplines really learn to think alike, given both health disciplines' varying socio-cultural histories and the differing complex systems they study?

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[3] Consensus is typically defined as "general accord and agreement" (Dictionary.com (n.d.). Retrieved June 1, 2005, from http://dictionary.reference.com/search?q=consensus)
or as "unanimity" in the sense of "being of one mind" (Merriam-Webster Online Dictionary (2005). Retrieved June 1, 2005, from http://www.m-w.com/cgi-bin/dictionary?book=Dictionary&va=consensus).

The answer would seem to be "No". For instance, how can a physician (whose knowledge is primarily concerned with an individual's bodily systems and sub-systems) and a social worker (whose training is primarily concerned with family, social and economic systems) 'be of one mind' in developing a treatment program? Not only are they dealing with different complex systems (and the knowledge associated with that system), they also have different criteria for measuring success: The doctor will typically measure it at the bodily level (for instance, in terms of the functioning of an organ), while the social worker will measure functionality in a more interpersonal or social sense.

Does this mean that interdisciplinary health teams are doomed to failure? Not at all! As is demonstrated every day by health practitioners across Canada, such teams achieve intelligent, effective solutions all the time. The problem is with the assumption that teams should aim for mental consensus or unanimity. Interdisciplinary teams can actually work very effectively, even in the absence of such consensus.

To illustrate this point, let us return to the example concerning the ulcer patient and the physician, pharmacist and social worker in the previous section. Is it necessary for these practitioners to learn each others' 'cognitive maps'? For instance, does the social worker need to learn about the pharmacology of ulcer medications? Or does the doctor or pharmacist need to be up-to-date on the latest forms of group addiction counselling? Of course not! What *is* necessary is that each of these practitioners listens to the others so that he or she can make sure that his or her particular contribution builds on and coordinates well with the others' contributions. As described above, this might mean that the social worker's counselling recommendations take into account possible drug side effects noted by the doctor or pharmacist. Or it might mean that doctor or pharmacist adjust their treatment or medication suggestions based on what they learn from the social worker about the effects of the patient's social context.

The crucial point here is that effective health teams do not have to achieve consensus, at least not in the sense of thinking alike or being 'of one mind'. Team members do not need to learn much, if anything, about each other's 'cognitive maps'; indeed, expecting every individual to become a health 'generalist' would require enormous additional education and training, and negate the value and efficiency of specialization. Instead, team members need to take responsibility for their own area of expertise and coordinate it effectively and flexibly with others' areas, so that their actions form a coherent whole.

A supporter of the consensus-based approach might object that in the situation I described, consensus exists not so much in team members' minds as in the realm of action, in the commonality of their work. Indeed, it is true that their actions should be more or less complementary and lead towards the accomplishment of a collective goal. However, having a collective goal is not that same as achieving consensus among the individual members of that collective. Recall that social collectives, including interdisciplinary groups, are complex systems and that complex systems can be 'greater than the sum their parts'; that is, they possess 'emergent' qualities that cannot be fully explained simply by analyzing them into their component parts.

This means that a group can be said to have a collective behaviour or goal that is not necessarily 'in' any of the members of that group, considered individually. In the context of interdisciplinary health teams, it means that a team can work together towards a common goal, in spite of the fact that specific individuals' understandings of that goal, and their contributions to it, may be quite limited and differ in significant ways. As interdisciplinary research expert Klein (2005) writes,

> Difference, tension, and conflict are not barriers that must be eliminated. They are part of the character of interdisciplinary knowledge negotiation. For that reason, interdisciplinary process is grounded in social learning. (p. 45)

In any case, the preceding gives us good reason to believe that consensus is something that is quite difficult and perhaps unnecessary to achieve in interdisciplinary teams. Furthermore, even if it could be achieved, consensus may actually be undesirable. A growing body of complexivist and complexity-compatible literature suggests that diversity and dissent are crucial to intelligent behaviour in complex systems, and that consensus-based approaches can lead to 'information cascades' and other forms of poor decision-making [20, 28]. In *The Wisdom of Crowds*, James Surowiecki, a leading business writer, expresses it thus:

> You do not need consensus in order…to tap into the wisdom of a crowd, and the search for consensus encourages tepid, lowest-common-denominator solutions which offend no one rather than exciting everyone. Instead of fostering the free exchange of conflicting

> views, consensus-driven groups—especially when the members are familiar with one another—tend to trade in the familiar and squelch provocative debate. (p. 203)

4.14 Consolidated Teamwork Checklist

In the previous sections, I explored the philosophical underpinnings of both the complexivist ideas and the existing course resources and the wider literature they reflected. As discussed, I found a number of philosophical divergences both *within* the existing literature and *between* this literature and the complexivist ideas. With these tensions and the complexivist insights developed in the previous sub-section in mind, I initiated work on a consolidated teamwork checklist.

I have already described the existing readings by Ray (1998) and Drinka and Clarke (2000). The various teamwork checklists in the existing course manual came from a variety of sources and were summarized, excerpted and adapted by course organizers to fit into approximately 2-3 pages. One drew on work by Benday in 1996 (as cited in Interprofessional Health Sciences Initiative, 2005, p. 16) and understood teamwork in terms of balancing team task focus with team process focus. Another, adapted from Tuckman (1965) and Weaver and Farrell (1997) described team development as passing through stages of "forming, storming, norming and performing". The third, taken from a 1996 University of Minnesota publication (as cited in Interprofessional Health Sciences Initiative, 2005, p. 18) focused on "eleven competencies for effective teamwork". Interestingly, all the checklists were quite general in focus and none dealt explicitly with healthcare or interdisciplinary teams.

As mentioned at the beginning of this chapter, the readings and checklist resources seemed to differ little from one another or the complexivist ideas—at least in terms of the practical guidance they gave for teamwork. For example, all stressed the importance of respecting diversity, facilitating communication or interaction, and establishing rules to enable the open discussion of ideas. However, as the preceding sections made clear, there are significant differences in the readings and resources' philosophical assumptions and orientations. Further, these differences had implication for how one might interpret their practical recommendations—especially in the specific context of interdisciplinary health teams.

I thus faced a number of challenges in putting together the consolidated checklist. *First*, it had to be clear and concise; the organizers told me to aim for only 2 to 3 pages. *Second*, it had to incorporate as many practical teamwork tips from the existing resources as possible, with no major omissions. *Third*, unlike the existing checklists, it should explicitly include at least some concrete illustrations from the context of interdisciplinary health teams. *Fourth*, I would probably have to choose a particular framework to, at least roughly, base the consolidated checklist on, using either the existing course resources or the new complexivist ideas. *Finally*, I would have to negotiate the overlapping but differing philosophical orientations from the practical, socio-cultural and complexivist approaches described in the previous sections—for example, regarding the nature and sources of disciplinary differences, or the possibility and desirability of achieving consensus in team decision making.

I realized that the last issue was probably the most potentially contentious. The organizers had expressed a great deal of interest and support for complexity and other new theories concerning interdisciplinarity and team learning; indeed, they had explicitly asked me to help them include these ideas in their curriculum. However, I had doubts about whether or not they would welcome some of these theories' implications, such as the socio-cultural approach's assertion of deep professional differences and associated political power struggles, or the complexivist view that teams could be seen as collective 'learners' that can form coherent plans even in the absence of consensus. (In the following section concerning the 'Course Collective', I describe how the teamwork checklist was received by the organizers and actually incorporated into course manual.)

After many revisions, I was in fact able to put together a concise, three page checklist. I believed that it incorporated all of the most important practical teamwork tips and concepts from the existing resources and literature (though later, in my work with facilitators, I would find out that I had omitted a few important ones—see Chapters 7 & 8). It also included a number of concrete illustrations from the context of interdisciplinary healthcare. Based on a suggestion from the course organizer, I added some healthcare context and bullet-point checklists in each section. (A copy of the actual consolidated checklist for teamwork that I submitted to the organizers can be found in **Appendix B** on p. 166. *Note*: The name we used to designate this resource—"checklist"—may be somewhat misleading, since it is fairly extensive and includes explanations of underlying concepts.)

The framework I choose for the checklist was based on Davis and Sumara's (2006) conditions to support the emergence of intelligent human collectives. As discussed in Chapter 2, I had developed a very similar list of conditions, with several small variations in terminology. For example, instead of the term "redundancies"—the common ground that enables agents within a complex system to interact and supports robustness—I used the term "commonalities" because that term had fewer negative connotations and linked well to existing teamwork resources' tips concerning establishing common goals and norms.

The summary included conceptual insights from all three of the orientations I discussed: practical, socio-cultural and complexivist. For instance, from the practical perspective, I was sure to include many tips concerning the importance of communicating clearly and having decision-making processes, as well as several references to Ray (1998). Drinka and Clarke's (2000) more challenging ideas from the socio-cultural perspective—for example, the assertion that all knowledge is inherently limited and partial—were stressed as well.

I addition to the framework itself, I added several complexivist insights from Davis and Sumara (2006), Surowiecki (2004) and Watts (2003). Among the most significant of these insights were 1) that diversity is the source of team's intelligence; 2) that creativity (or openness) and rules (or constraints) are not necessarily opposed but can actually support one another; and 3) that teams that have decentralized, or shared, decision-making power are actually more likely to produce innovative, 'more than the sum of their parts' solutions than traditional, hierarchical teams.

Perhaps the biggest contribution the complexivist ideas made, however, was in the background theoretical orientation and in what was *not* said. For example, in the first section on "Diversity & Commonality", I did *not* say that professionals from different disciplines needed to learn each other's paradigms, or 'cognitive maps'. A certain amount of overlap in team members' core subject area knowledge, goals and values is certainly important; but apart from that, diversity or specialization among team members should be the actively cultivated since it "expands a group's set of possible solutions and allows the group to conceptualize problems in novel ways" (Surowiecki, 2004, p. 36).

Similarly, in the section on "Decentralized Interactions & Organization", I did *not* say that teams should aim for consensus, or similar thinking, in their decision-making. Instead, I wrote that team members needed to find ways to bring together and coordinate their *differing* professional contributions into a coherent collective treatment plan—even if none of them individually understood all the aspects of that plan.

Once completed, the consolidated teamwork checklist was submitted to the course coordinator, for distribution to the other course organizers. The organizers were to give their feedback on the form and content of the checklist, as well as suggestions concerning how it might be incorporated into the rest of the curriculum. What happened during this next stage is described below.

4.2 The Course Collective

After turning over my draft of the checklist to the course coordinator, I spent more than a month focusing on a variety of personal and academic issues, including the birth of my second child. The course coordinator had also been very busy, putting together the student and facilitator manuals and taking care of the enormous number of practical details involved in administering a course for almost 1000 students: room bookings, audio and video needs, recruiting and training facilitators from the faculty and community clinics, finding local educational and health institutions at which students could make their presentations, and so on.

During this time, the coordinator had given me feedback on the new consolidated checklist, but most of it concerned issues of form (for example, including more bullet lists) and small practical changes (such as adding a sentence about the specific healthcare contexts in which interdisciplinary teams are becoming the norm). One significant change was the omission of any explicit reference to complexity science—though the checklist framework, terminology and general approach remained quite complexivist in orientation. The basic ideas presented in the checklist did not otherwise become an issue.

In retrospect I realized that during this time, I did not receive any direct feedback from the other organizers, except for one who provided positive general feedback (but few concrete details) regarding the general idea of using complexity as a model for understanding interdisciplinary teamwork. If the rest had in fact offered feedback on the checklist, most likely they had given it to the course coordinator herself. I therefore had to assume that their feedback was expressed through the course coordinator's comments.

Several months before the course began and just a few days before the course manuals were due to be printed, the organizers had another meeting at one member's house. Due to various personal and work commitments, only 4 of the 8 organizers were able to attend.

Before the meeting started, I spoke at length with the course coordinator. She told me that, as planned, the complexity-inspired readings by Surowiecki (2004) would replace the longer, more detailed readings by Drinka and Clarke (2000). There was support for including the consolidated teamwork checklist in the manual as well. However, instead of *replacing* the various existing checklists, the current plan was to *add* it to them. This was somewhat disappointing to me, since one of my original critiques of the manual was the large number of existing checklists—something that I thought might serve to confuse busy facilitators and students.

We then discussed this issue of linking the consolidated teamwork checklist to the healthcare case scenarios students worked through and the corresponding evaluations. We both thought that it would be a good idea to have this kind of consistent framework throughout the course. However, we also recognized that such a change would require extensive revisions of the manual.

This would be difficult to achieve for two reasons. First, we were running out of time to make the changes before the manuals were due to be printed. Second, such widespread changes would require the consent of the other organizers, but it was unlikely that we would be able to gather them all together again on such short notice (we obviously could not enact the widespread changes we were contemplating in time for the meeting that was about to begin). We therefore decided that it might be best to leave the case scenarios and evaluations as they were for the current year.

In any case, the organizers who attended that meeting approved of all the changes the course coordinator and I had worked on so far, suggesting only minor amendments. They also shared our view that a consistent teamwork checklist throughout the course would be valuable, but that it was probably not something we could accomplish this year.

We did, however, agree that it would be a good issue to revisit for the following year (as we shall see in Chapters 9 to 11, this issue was indeed revisited and acted upon, though with several unpredictable developments). Furthermore, we thought it best to test the complexivist framework and ideas with a limited number of facilitators before making them the central teamwork checklist resource to be used in the course. My work with this limited number of facilitators is the focus of the next action research cycle described in Chapters 6 to 8.

5.0 Chapter 5: Reflection

In this chapter, I reflect on what happened during the first action research cycle, that is, both in my personal interactions with the course organizers and in the interaction of our ideas that occurred through mixing complexivist ideas into the existing course curriculum. Of course, this collaboration had effects on multiple, intertwined levels—individual, group, and wider social and institutional contexts—and so the reflections in the first part of this chapter are organized by level. In the second half of the chapter, I examine events from the perspective of action research, to see if and to what extent our collaboration accorded with this methodology's requirements for democratic participation, ethical involvement, creation of new knowledge, spiral processes, and so.

5.1 Individual, Group and Institutional Level Reflections

Individual Level (Myself)

As a PhD student researcher in a group of tenured and non-tenured faculty and administrators, I held the least power. This situation was quite different from more typical action research projects in which an 'outsider' academic researcher has greater socio-economic status and controls access to grant money.

Nevertheless, I felt that after the first few meetings in which I demonstrated my commitment to the course and the organizers' collective, I was treated more or less as an equal. The changes I had helped to bring to the course manual were fairly limited, but I had contributed as much as any other individual organizer to the curriculum changes in that year. Indeed, I was quite happy with my role as a 'co-organizer' and I began to think of the course as something 'we' did, rather than something 'they' (the organizers) did. I also started to get a real sense of the deep relationships among many of the organizers, relationships that supported their collective work. Without noticing it, I was identifying more and more with the organizers' healthcare philosophy and goals for the course, as well as the frustrations they sometimes felt in their relationship with the larger university community. For example, I began to bristle when hearing—usually second hand—about criticisms of INTD 410 made by outside faculty members. (These and other aspects of the course's relationship to the university community will be dealt with in detail in the Institutional Level section below.)

My increasing identification with the organizers created an unexpected personal tension, however. On the one hand, I felt pulled into the course context and the organizers' ways of seeing things; on the other, I felt pulled by my role as a researcher and by the complexivist theoretical ideas I was exploring. For example, when proposing changes to the curriculum, the former pull made me want to recommend less radical changes and to not expressly invoke challenging complexivist concepts. On the other hand, I realized that my role within the group—the 'valuable diversity' I offered the organizers—was precisely these new and challenging ideas, and that I should not necessarily shy away from discomforting pre-existing opinions.

To further complicate matters, these two 'pulls' were not necessarily opposed; to me, they often seemed to complement one another. For example, many of the organizers had stressed to me the importance of having a theoretically sound model for understanding interdisciplinary teamwork. This model could be used not only in course pedagogy, but also to justify the importance of the course and its non-traditional approach to critics from the various healthcare faculties. I believed that complexity and associated theories of social learning, with their explicit accounts of disciplinary knowledge differences and collective level learning, could offer this model. And several of the organizers seemed to concur; for example, one integrated complexivist ideas into curriculum she was developing for another interdisciplinary health course.

Indeed, I felt great ethical responsibility towards the group and the changes I had helped to introduce to the curriculum. As both critical pedagogues and complexivist educators stress (see Chapter 3), I was complicit in the unfolding situation and the possibilities it presented for transformation. Since I was studying education, the group treated me as having some authority in matters of education and learning theory. And because of my background in philosophy and law, I knew I could be quite persuasive in written and oral presentations.

But would the changes I helped to bring about truly support the organizers—in terms of both their desire to create better curriculum for students and facilitators and their relationships within the larger university community? Ultimately, I had to trust a great deal in the organizers' good judgment and their experience in instructing and administering the course. None of us could predict in advance exactly what consequences would flow from the changes, but since the organizers agreed that the changes were worthwhile and we collectively decided on how to implement them, then at least an appropriate process for harnessing the group's wisdom had been followed. As the complexivist teamwork ideas developed earlier make clear, my role as an individual was not to understand or control everything that a team does; rather it was to represent and advocate for the diverse perspective I brought and work with others and their differing perspectives in order to achieve a coherent collective plan.

Group Level (Organizers)

Within the group of organizers (including myself) responsible for overseeing the course and setting curriculum, there seemed to be relatively little overt power-related tension. Most members of the group had worked together for many years and had learned to trust one another, even when there was significant disagreement. For the most part, discussions were carried out in an egalitarian manner: Everyone had a chance to speak, dissent was not only tolerated but encouraged, and decisions were arrived at in a democratic fashion.

Some organizers came from larger departments or faculties that arguably held greater power and status within the university. However, this seemed not to affect their influence at meetings. Indeed, many of the organizers who most regularly attended the meetings, and thus influenced decisions the most, came from smaller departments such as medical laboratory science, occupational therapy, pharmacy and dental hygiene. Perhaps the very reason they were so diligent about attending INTD 410 organizer meetings was that their voice had greater importance there than in other university forums.

It is common in popular and academic discourse to frame interprofessional health relations in terms of tensions between (mostly) analytic physician perspectives and (mostly) holistic nursing and social work perspectives. Drinka and Clarke (2000), for example, characterize health education as being locked in a "power struggle between two very different value systems: one more reductionist and scientific, the other more social and humanistic" (p. 70). In medical education, the former reigns ascendant, while nursing and social work are more oriented towards, respectively, a holistic view of the "patient as person" (p. 72) and "socialization for advocacy and empowerment" (p. 74). Hall (2005) makes a similar distinction:

> Physicians traditionally learn independently in a highly competitive academic milieu. Nurses learn early in their career to work as a team, collectively working out problems… (p. 190)

> The culture of physician training has focused on action and outcome more than on relationships...Nurses and social workers...may value the patients' story and will not rely on objective data as heavily as do physicians. (p. 191)

Perhaps surprisingly, this tension between professional worldviews was not immediately apparent in the events described in the preceding chapters. There was one manifestation of it, namely, in the question that was put to me at the annual meeting concerning whether or not the ideas I was introducing had been "empirically verified". And in fact this speaker did come from a professional faculty that strongly valued reductionist, scientific and qualitative approaches.

However, the INTD 410's organizers' views on these matters could not be easily or simply categorized. All showed some openness to holistic, relational ways of thinking. Had they not, they would likely have not become involved in an interdisciplinary health teams course in the first place. A number of them did seem *more* open to holistic ways of thinking than others. But even they had been educated (at least in part) in traditional, reductionist scientific ways of thinking and were influenced by those paradigms as well. Finally, as observed above, the division of power between organizers seemed fairly equal and not skewed in any obvious way by professional background. It likely would not have been possible for organizers from the more "reductionist" professions to impose their views on the others, even if they had been inclined to do so.

In retrospect, the question posed concerning empirical verification presented an opportunity for the organizers and me to stop and consider more deeply the idea of verification or validation, and the underlying tension between traditional scientific understandings and alternative understandings developed in the social sciences. Although neither I nor (I must assume) the organizers had prepared to discuss this issue, some productive conversations may have resulted. Even if we did not reach any agreements or conclusions, a space would have been opened to discuss these topics, which may in the future have led to better understandings of the relationships between these ideas, at least in our particular context. Unfortunately, though, the opportunity to confront this issue head on—and to explore it as a potentially productive "aporia"[4]—was missed.

Institutional Level (University and Beyond)

Writing in the Canadian Context, Hall (2005) has observed

> More often than not, universities have been remiss in valuing and helping faculty to develop the experience needed to move interprofessional education forward. Innovations that do occur are usually led by a few enthusiastic and energetic champions who struggle to overcome institutional barriers while continuing with their regular academic duties. (p. 193)[5]

I did not generally have first hand exposure to the relationship between, on the one hand, the course and its organizers and, on the other, their wider institutional contexts. What I learned was mostly gleaned second-hand, through my attendance at meetings and casual conversations with organizers. Nonetheless, I did get a strong impression of the sort of pressures and frustrations the organizers faced.

Although most of the healthcare faculties and administrators officially supported INTD 410 and the idea of teamwork, the realities were a little more complicated. Individual professors in health faculties who were not involved with the course would sometimes denigrate the course's focus on 'soft' team skills and the time the course took away from traditional curriculum. Further, this attitude would sometimes filter down to the students taking the course—something that presented a pedagogical challenge for organizers and facilitators.

The ambivalence of faculties and administrators to the course was also manifested in staffing issues. Some faculties regularly failed to provide a sufficient number of facilitators to instruct the course (each faculty was assigned a quota for facilitators, depending on the number of students they had enrolled in INTD 410). In addition, healthcare professionals from the surrounding communities hospitals and clinics who agreed to act as facilitators received very little compensation (approximately $500 for a 5 week course, with 7.5 hours of in-class time per week, plus training, marking and travel).

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[4] A figure of speech in which the speaker expresses or purports to be in doubt about a question. An insoluble contradiction or paradox in a text's meanings. (Dictionary.com (n.d.). Retrieved April 1, 2007, from http://dictionary.reference.com/search?q=aporia)

[5] Hall (2005) also observes, however, that enthusiasm for interprofessional teamwork "is seeping into academic circles" (p. 194).

The course faced ‘official’ pressure from the faculties as well. Although student evaluations of the course had improved over the years and it was now considered about average compared to other courses, organizers felt pressure from several faculties to improve student evaluations.

Significantly, it has been observed in educational literature that interdisciplinary courses tend to attract more scrutiny and criticism than other courses, since they 1) cannot hide behind disciplinary boundaries, 2) often employ non-traditional teaching formats like team teaching, and 3) tend to threaten the status quo (Beane, 2002).

A number of writers influenced by critical theory have also pointed out how interdisciplinary activities are often avoided, disrespected or repressed within the academy due to their violation of disciplinary boundaries and corresponding threat to established power structures (Kent, 1994; Sumner, 2003). Sumner (2003) in particular has argued that those who seek to understand interdisciplinary issues in universities must look not only to epistemological differences, but also to issues of power and politics, such as whose interests interdisciplinary research serves. She therefore advocates infusing interdisciplinary studies with a critical awareness of these latter issues in order to adopt a stance of “critical interdisciplinarity” (para 37). Without such a critical approach, researchers run the risk of simply “colluding with power, reinforcing the status quo, contributing to current problems, and blocking paths to progressive change” (para 57).

As the preceding discussions show, political and power issues were certainly operating in this context—expressed, for example, in the way faculty members in more traditional, specialized areas decried and resisted the dedication of resources to INTD 410. Again, however, the reality of the situation was such that it could not be simply or easily categorized, for instance, as a small group of interdisciplinarians resisting monolithic institutional pressure to specialize. There was also significant institutional pressure *in favour of* interdisciplinary approaches. For example, I was told many times by high-ranking organizers that the university put pressure on faculties to collaborate more, in order to reduce costs. And professional bodies such as the Canadian Medical Association (representing physicians) had recently made education or training relating to healthcare teamwork a mandatory (albeit small) part of physicians’ education.

In any case, as mentioned above, I found myself identifying more and more with the organizers' perspective, wanting to 'take their part' and resist the political and institutional forces that worked against the course and its aims.

5.2 Action Research?

This last reflection raises the issue of whether or not my collaboration with the organizers to this point had really followed action research principles. As described in the Introduction, distinctive features of action research include 1) its collaborative, reflexive nature and foregrounding of ethical concerns, 2) its claim to respect principles of democratic participation, 3) its aim of creating new knowledge, and 4) a spiral process of reflection, planning, acting, observing, reflection, and so on.

The preceding reflections on my role within the group would seem to address the requirement for researcher reflexivity and consciousness of one's own ethical complicity in the unfolding of events. My work with the organizers of the course to bring new complexivist ideas into the curriculum also seemed, at least prima facie, to be collaborative in nature.

However, it is not clear that the degree of collaboration was sufficient to meet action research's requirements for democratic participation. All the organizers voted on the type of changes to pursue, but the course coordinator and I played a larger role than the others in actually carrying out the specifics of those changes. Kanu (1997) raises the dilemma of differing contributions among collaborators in the action research process but offers no easy answers to this dilemma (p. 172).

Both Adelman (1993) and Valla (2002) have written that a truly democratic approach to research requires the active participation of *all* those affected by the issue or change to be studied. That was certainly not the case, at least at this stage of the research, since the students and facilitators who would also be affected by the change in curriculum were not involved. However, this seems like a difficult principle to achieve in practice, since virtually any significant change will have ripple effects beyond the immediate community involved. For instance, even if I were somehow to include all the students and facilitators in a given academic year in research curricular change, that would still leave out those who would be taking the course in future years, as well as others in the university and surrounding healthcare communities who would be affected by the changes.

Action research also aims to create new knowledge grounded in the knowledge and experiences of the participants. As Valla (2002) writes, participants must feel that without their contribution, the knowledge could not have been produced (p. 173). Was that true in the current research? I certainly contributed, through the introduction of complexivist ideas and my intellectual work of 'mixing' the complexivist and existing course ideas. The course coordinator also offered a great deal of feedback and shaped the final 'product'. And at least one of the organizers voiced strong on-going support for the general idea of using complexity as a model for understanding interdisciplinary teamwork.

But what about the other organizers; what did they contribute, apart from approving the changes at the two meetings? As discussed in Chapter 4, any other feedback they contributed with respect to the curriculum changes was channelled through the course coordinator, so I cannot comment on the extent of their contribution. At this stage in the research at least, I would have to say that their contribution came largely through the ideas present in the existing course manual. They had chosen the readings and checklists in previous years, and adapted them to the specific context of the course. In 'mixing' the complexivist ideas with the existing course ideas and resources, therefore, it could be argued that we were really putting together our differing knowledge and experiences in order to create new knowledge.

It is possible that in this 'mixing' of ideas, everyone's ideas were not treated equally. Perhaps, in adopting a complexivist framework for the consolidated teamwork checklist, I had overemphasized *my* knowledge and experience at the expense of some of the other organizers'. This might explain why at least some of the organizers had been reluctant to replace all the existing checklists with the new consolidated one that I had produced.

These considerations concerning collaboration and participation in knowledge creation are also very important from a complexivist perspective, since they point to whether or not a complex social collective truly emerged around the ideas and curriculum that were being developed. Judging from the preceding discussion, it seems that some sort of discernable collective did emerge, including myself, the course coordinator and several organizers who contributed to, voiced support for, or otherwise 'took ownership' of what was developed.

There is reason to believe, though, that at least some organizers played a more passive or reluctant role. However, such passivity or dissent may not necessarily be an impediment to participation in an emergent collective. As Cilliers (1998) writes, agents in a complex system need not be in accord with, or even understand, the emergent direction of the system as a whole (p. 5). And Wenger et al. (2002) observe that even those on the periphery, who appear to contribute little to discussions, may play a legitimate and essential role in communities of practice (p. 4). In any case, these issues of collaboration and participation in knowledge creation were ones that I would have to pay careful attention to throughout the research process.

A final requirement of action research is that it should at least approximate a spiral process of reflection, planning, acting, observing, reflection, and so on. The chapters in this first part, or 'spiral', of the dissertation use this process as an organizing structure. But the actual research process is, of course, not so easily compartmentalized. For instance, there were elements of action and observation in meeting with organizers described in the *Planning* chapter (Chapter 3).

Furthermore, the *Action and Observation* chapter (Chapter 4) dealt largely with ideas—the interaction of differing ideas from the existing course manual and complexity science. In other contexts, this might be considered more suitable to the reflection stage of the action research process. In the context of the current research project, however, this bringing together of ideas to create new knowledge about interdisciplinary health teams *was* the first major action that we had collectively planned. None of us were exactly sure where it might lead, and the results merited both observation and reflection.

This marks the end of the first action research spiral and also the beginning of the next spiral. The next cycle deals with my collaboration with classroom facilitators to see how the ideas developed in the first cycle relate to their interdisciplinary practice and pedagogy.

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Cycle 2: Working With the Facilitators

The second action research cycle, which includes Chapters 6 to 8, focuses on my collaboration with course facilitators. It covers a period of time immediately before, during and after the INTD 410 course took place. The purpose of our collaboration was to see how the ideas developed in the first cycle would relate to, and interact with, facilitators' ideas and experiences of interdisciplinary practice and pedagogy. As we shall see in the following chapters, both the complexivist ideas and the facilitators' ideas, practices and pedagogy were affected through this interaction—creating new knowledge in the process.

6.0 Chapter 6: Planning

In the months leading up to the 'delivery' of INTD 410, I had not only been working on curricular changes. With the course coordinator and under the periodic oversight of the other organizers, I had also been developing a plan for collaborating with a few of the course's instructors, or "facilitators". As discussed in the previous cycle, a large group of facilitators (usually over 50) instructed—or more accurately, facilitated—the various sections of INTD 410, usually in teams of two or three. This group included academics from the participating health faculties as well as practitioners from the surrounding hospitals and community clinics.

All the facilitators and students would be using the manual with complexity-based changes described in the first cycle. As we have seen, however, these changes were relatively modest. The course coordinator and other organizers thought that before making more wide-ranging changes to the course curriculum, it would be best for me to 'pilot' the ideas in a more extensive manner with a limited number of facilitators.

The plan we developed was as follows. I would recruit 3 to 8 of the facilitators. Their participation would be voluntary and based on their interest in the research project and its complexivist theoretical orientation. Indeed, because the course coordinator had difficulty attracting sufficient numbers of facilitators and their duties were fairly time-consuming, it was important that their participation be perceived as entirely voluntary and not impose too much of an additional burden in terms of time, reading or other work.

I would collaborate with these volunteer facilitators in several ways. First, I would provide them with accessible readings on complexity science and its application to healthcare and teams. Second, I would meet with each of the facilitators at least once before the start of the course to discuss complexity science and how it might be brought into their practice and pedagogy—as well as how their professional insights might in turn affect the complexivist ideas we were developing. Third, I would make myself available to facilitators on an on-going basis for the duration of the course, in case they wished to further discuss complexivist ideas related to healthcare teamwork and how those ideas might be incorporated into specific class activities.

Data related to my work with facilitators would be collected in a number of ways. First, I would keep detailed notes on meetings and email exchanges. Second, I would conduct and record end-of-course interviews with each individual facilitator. Third, if facilitators' schedules permitted, I would conduct and record a focus group interview. Fourth, I would keep a 'diary of participation' in which to record and reflect upon my thoughts, feelings and motivations in relation to this collaboration. Finally, I would provide each of the facilitators with a copy of those portions of the dissertation that related to my collaboration with them—as well as other sections, if they were interested.

The end-of-course interviews with instructors would be semi-structured, opening a topic for discussion, but not prescribing the nature of the answer (though proscriptively, I would try to ensure that interviewees stay focused on topics relevant to the course and research topic). The actual questions asked would likely include the following:

- Was the Surowiecki (2004) reading [or other complexivist reading] helpful to you? How? Why or why not? What about your students?
- What about the other complexivist materials, for example, the complexity-inspired teamwork checklist on what makes teams 'smart'? Helpful or not? Why?
- Do you think the ideas I brought to the course were well-suited to the practical, day-to-day realities of health care teams? Why or why not? Which parts were or weren't?
- How do you think the ideas should change to better suit your day-to-day realities?
- Will you change your teaching in this course as a result of the introduction of these complexivist ideas? What about your own practice as a member of a health care team?
- Did you feel that these ideas were "imposed from above" by the organizers of the course? If so, how would you have done things differently?
- How did your students react to the ideas? Did many take them up? Did some resist? How?
- How might these ideas be better used in the course in the future?

This plan was put in motion a month before the 2006 INTD 410 course was to commence, during the evening preparation/training sessions were held for facilitators. The first session was primarily for first time facilitators and offered a basic introduction to the course, its curriculum, and its conceptual orientation. At this session, I and the other organizers also dramatically modeled both good and bad team behaviours—for example, with respect to listening to teammates. (Interestingly, the organizers had arrived at the conclusion that modeling team behaviours was usually more effective than talking about them didactically; this approach accords well with Lave and Wenger's (1991) 'communities of practice' writings, with their emphasis on giving learners access to experienced practitioners' practice rather than didactic instruction.)

The second evening session was for both new and experienced facilitators. It was at this session that I got a chance to speak for 15 minutes about the research I was involved in—namely, introducing new complexity-based educational ideas into the course curriculum and pedagogy.

My 15-minute presentation began with a brief review of the development of complexity science and its application to systems ranging from cells and organs to social, cultural and ecological collectives. Then I described the purpose of the research, some of the ideas we were developing, and how we were interested in their insights and feedback. Third, I described the sort of involvement tentatively planned for facilitators who wished to participate. I was careful to emphasize that participation in this research was entirely optional, that participants could withdraw at any time, and that their participation or non-participation would not affect their status as facilitators in any way. Finally, I suggested that people who were interested in participating could email me or contact me in person during a break; in the days that followed, I would email interested parties more information on the research project and confirm their intention to participate.

Fortunately, there was interest on the part of the facilitators. Eleven people spoke to me at the training session; eight said they definitely wanted to participate and three offered to do so if no one else volunteered. Since all of the former eight did in fact commit to participate in the week or two that followed, I thanked that latter three but said that I had sufficient numbers (as discussed earlier, I had planned for 3 to 8 participant facilitators).

After securing the eight facilitators' willing participation, I sent them an email with attachments and links to accessible readings on complexity science and its application to healthcare and teams. These readings included not only the Surowiecki chapters and the "What Makes Teams Smart" teamwork checklist developed during the first cycle, but also

- "Applying Complexity Science to Health and Healthcare" (Center for the Study of Healthcare Management, 2003),
- A link to the "Complexity and Education Glossary" (McMurtry et al., 2004), and
- An excerpt from my candidacy paper—"Complexity Science and Learning in Interdisciplinary Healthcare Teams"—dealing with the conditions for complex emergence in health teams

A week after sending out this email, I contacted the participating facilitators to set up a time to meet and discuss the readings and hear how they thought the ideas presented related to their own experience with interdisciplinary health team practice and education. As it turned out, I was able to meet with all the facilitators, either before or during the first week of class, for approximately one hour. (As we shall see in the next chapter, a number of valuable insights emerged from these meetings and subsequent developments.)

In one of the earlier meetings, a facilitator suggested that instead of simply being "available" for them during the course, I ought to email them each week to begin a discussion of the ways in which the complexivist ideas might be integrated into the class activities for that week. At the subsequent meetings, I asked facilitators whether they thought this somewhat more pro-active approach was a good idea, and they all concurred. I got the feeling that they preferred this means of communication, since they could engage in discussion if their time and interest permitted, and not engage in it if they were too busy. These weekly emails, which I tried to make brief and humorous, thus became a significant part of our collaboration.

The interviews and focus group I planned after the end of term went fairly smoothly too. I was able to schedule, conduct and record individual interviews with seven of the eight facilitators. The focus group happened to land on a night with blizzard conditions and major traffic delays. Still, four of the eight facilitators were able to attend, share insights, and build on one another's ideas.

During this time, I also benefited from an expectedly rich source of information: Informal meetings and discussions I had with course organizers and facilitators, several of whom were senior faculty members at the university. Their observations, insights and goals for the course gave me a further valuable glimpse into both the course's day-to-day pedagogy and broader issues relating to interprofessional and interfaculty relations.

This chapter, which is titled “Planning”, has described not only plans that were made, but also several actions that were carried out. However, these brief descriptions of the events and actions really only set out a framework for addressing the more important actions and observations carried out in the next Chapter. Again, the real “action” was the interaction of ideas and resultant changes in practice that are described in what follows.

7.0 Chapter 7: Action and Observation

During the interviews and focus group with facilitators, discussions touched upon many levels of belief and practice, including individual facilitator and student knowledge and actions; team dynamics, conversations and decisions; classroom events and general atmosphere; intra- and inter-faculty relations within the university; policies and practices at local community hospitals and clinics; and controversial developments and issues at the level of professional associations and government.

It might therefore seem logical to organize this chapter, and the interactions and ideas represented within it, according to level of phenomena. However, virtually every idea we discussed—for instance, the general applicability of complexity science to facilitator practice, or the balance between diversity and commonality health teamwork—spilled messily across levels.

The only structure that really gave coherence to our many discussions was the ideas or topics themselves—both complexivist ideas I helped to introduce and those ideas that emerged during the course of the research. I therefore chose to organize this chapter by idea or topic. As we shall see, it includes a great deal of participant voice and presents a rich picture of interdisciplinary education and practice.

7.1 The Relevance of the Complexivist Ideas for Interdisciplinary Health Teamwork and Practice–In General

Resonating with and Extending Facilitators' Thinking

The complexity-inspired ideas discussed and developed in the first action research cycle seemed to resonate very strongly with facilitators' experiences and 'philosophies' of healthcare. These ideas included not only the consolidated teamwork checklist and its conditions for supporting complexity in social collectives (*diversity*, *commonality* and so on) but also background concepts such as emergence, self-organization, and the nestedness of living systems.

For example, one facilitator felt that the ideas were a "wonderful addition" to the course. Another said of the new Surowiecki readings,

> I really had fun reading those because I could see, especially for myself as a healthcare executive, how that team [in the readings] really failed at so many stages to prevent a lot of the errors that were made. So I could appreciate it from a professional standpoint, and I

> could also see how that would apply to the healthcare standpoint for a healthcare interdisciplinary team.

A third observed,

> Actually I think it did help because, first of all, it made me aware of the ideas, like the diversity, complexity, sharing of ideas…All of those things actually were quite clear in my mind…[and] were probably there [during class] without me really consciously thinking about it at the moment in time…Definitely more than I would have thought about previously…So that was really interesting and that was great.

Finally, one very experienced facilitator came to believe that

> [Complexity science] is a real living model of how to understand what makes people's working together…why it works, why it doesn't work and what components help to strengthen the work that they do. And so to me it just seemed to be…a conceptual framework that was very applicable…I felt like I was more credible this year. More confident as well.

Several facilitators noted that the complexivist ideas fit well with Eastern and Aboriginal philosophies that influenced them and guided their practice. One believed deeply in the Taoist concept of Yin and Yang. She therefore particularly appreciated the way the consolidated teamwork checklist's conditions—diversity and commonality, openness and constraints, and so on—had been arranged not as absolutes, but rather as complementary opposites that ought to be held in balance: "what I think is helpful about it [the consolidated teamwork checklist's conditions] is that it gives you a way to think about balancing things that are held in tension." Another noted the parallels between complexity and the organic, aboriginal philosophies he and other hospital counsellors drew upon in their practice. Patient care, he felt, ought to be about dialogue and appreciating patients' particular contexts, rather than simply moving in a linear fashion towards a specific endpoint.

Significantly, the new ideas did not merely echo facilitators' pre-existing beliefs; they also provided a new vocabulary and conceptual tools for understanding their experience. As one facilitator put it,

> [E]verything that you said I've read and I've really enjoyed, and it makes me stop and think. And as you can see sometimes I find it difficult to put words to what I actually do and why I believe and the way that I feel.

Several others offered similar observations. "I thought adding the ideas was helpful because it did help me conceptualize", stated one. "It's almost like it has put a name to it", said another.

The Idea of Nested Complex Systems in Healthcare

One background concept that particularly resonated with facilitators was complexity's depiction of the 'nestedness' of living systems. Recall from the first cycle of this dissertation that complexivists view living systems (such as cells, organs, individuals, social groups and ecosystems) as being deeply connected with, or "nesting within", one another. Yet at the same time, because they are complex systems with emergent qualities, such systems are never entirely reducible to, or commensurable with, one another.

In the context of healthcare, this means that complex patient problems typically involve many levels, and that very different sorts of professional knowledge must be brought together to address these problems. During the interviews, I had shown facilitators a very basic hand-drawn illustration of the nested living systems related to healthcare. (See **Appendix C** on p. 169 for a representation of these nested living systems and fields of inquiry associated with their study.)

All of the facilitators agreed with this way of depicting patient health issues. One noted that it accorded well with the common view that the "determinants of health" included not only biomedical causes but also psychological, social, economic and environmental ones. Another said that it helped her to conceptualize the nature/nurture debates in her field; more specifically, it highlighted for her how these two different "causes" of health problems were in fact both important and deeply interconnected. A third linked it to a problem he often heard voiced by patients: That they had heard about 'parts' of their problem from a number of different specialists, but that no-one had really put these parts together into a "whole" or "big picture" for them.

Several facilitators thought that this was a crucial idea to convey to students in INTD 410. "[T]hat's the thinking we want these people to have", observed one. "And I think there needs to be something built into [the curriculum], when we're discussing theories…that somehow those other levels that are getting ignored be built in", said another.

Finally, one applied the idea of nested systems beyond healthcare to the actual INTD 410 course setting:

> [It] gives me some context for [the course]…systems within systems within systems. You've got individuals within teams, within sections, within a program. And so the program is giving something to each section. The section is giving something to each team. The team is giving something to each student. And at each level there is a variation.

As we shall see in the final section of this chapter dealing with *openness & constraints*, the complexivist idea of nested living systems takes on unexpected importance. A facilitator uses the idea to develop an innovative conceptual tool for student teams and a more elaborate version of this tool is used to propose a significant change to the course curriculum.

Perceived Need for a 'Strong' Theory

One issue that arose unexpectedly was the urgent need several facilitators saw for a "strong" theoretical framework to provide both a justification and an organizational structure for the course. The course needed theoretical justification, they felt, because many students and health practitioners thought teamwork education was "trivial and warm and fuzzy". One senior faculty member, for example, observed that although "the way of the future is teams", the majority of students and faculty had been "trained in silos" and viewed the interdisciplinary health teams course in a negative light.

One person who had acted as a facilitator for many years described the course's existing theoretical orientation in the following way:

> To my mind there has not been a lot of rhyme or reason as to why it hasn't or has worked, other than these very simplified formulas of rules and consensus building. And to me it's a lot more complex than that and yet we've developed it based on some very basic ideas…the problem is…it doesn't have…a foundation and a conceptual model…And students need that. I really feel that they just haven't felt that it has had credibility, because it hasn't had any sort of depth of knowledge or principles behind it, besides these very simple consensus/conflict [models] based on 3 or 4 rules…That's just too 'lunch hour'… Most people they work with aren't going to understand the principles of teams. And so we have to get them more than these…[*Interviewer says: "Platitudes".*] Ya, because it's going to be very, very hard work.

This facilitator and others stressed the need for some kind of theoretical framework to link the various classroom activities and client scenarios.

> I thought the activities were excellent, but I wonder if the students saw the connection between what they were doing…The connections are tenuous between class to class to class…The activities have to be related back to the model in some way…Again, I think the big thing is that I would add the visibility of the connections. That the connections have to be visible.

Others elaborated on this idea, stressing the need to incorporate the theoretical framework into the reflection questions students completed at the end of class.

7.2 The Relevance of the Complexivist Ideas for Pedagogy—In General

All of the facilitators agreed that the complexivist ideas proved helpful to them as facilitators. One remarked, "I thought it was a very useful thing for me to have the background." Another found the readings especially helpful and would have liked to see the ideas in the facilitator orientation. One facilitator even used the ideas to articulate a less mechanistic and more contextually sensitive pedagogy:

> [I]t's not just…this is the content or this is the skill. The actual process of learning that skill is going to be a little bit different in each team…[and] going to be a little bit different in each section because the input is a little different. It's not reduced to a mathematical formula or a specific set of facts that's being communicated and regurgitated.

Explicit Framework for Students?

There was less agreement, however, about whether or not the complexivist ideas ought to be explicitly introduced to students. Several facilitators thought they ought to be. One said,

> I thought it was a very good theory to showcase to the students…to point out the things that I had seen about the errors in the team and perhaps, kind of highlight for them [that] this is what can happen.

Another stated "I know if I had it to do it over right away, I would do it differently and I would talk about complexity right at the beginning, like the first day that we got together." However, she later qualified this support, saying that many students "would not understand it or grasp it", due to their lack of maturity and experience with other disciplines or professions. Her own experience was offered as an illustration:

> When I just worked in hospital, that was all I knew and that was all I understood. And it wasn't until I branched out into community [health and services] that a whole new world opened up to me.

One facilitator felt the ideas would be useful to students, so long as they were kept in a relatively simple form:

> And if we were to incorporate it, I don't think we'd be able to go into it in as much detail. But even having like a basic concept for the students to kind of, you know, chew on, might be interesting for them.

A fourth facilitator felt that she and many of her students benefited little from readings and theories of any sort, and would learn much better from being immersed in practice (in this case the practice of teamwork). However, she granted that other people, with different "learning styles", might well benefit from the explicit use of theoretical frameworks generally and complexity specifically: "There's always going to be one or two skeptics in the group that need to have that intellectual framework to hang their hat on". This, she felt, was particularly important for students in the hard sciences, since

> hardcore science types or academics…look at social theories and social frameworks and psychological frameworks and psychological theories as fluffy stuff not grounded in science…not grounded in literature.

Even among those who believed that the complexivist ideas ought to be used as an explicit theoretical framework with students, there were qualifications expressed. One facilitator emphasized the importance of providing concrete examples:

> I would find it useful to continue to have those ideas there as part of the framework. What might be helpful [though] are some specific examples of how these ideas might fit into a course or a team, or how someone has used them.

Another believed that multiple theoretical perspectives—and not just complexity—should be used to structure the course, since using only one would render the course manual too simple and mechanical, and not sufficiently open and complex.

How Best to Employ the Ideas in Class

Facilitators also had differing opinions on what sort of precise role the ideas ought to have in classroom activities and pedagogy. Some thought the ideas should be used to structure and tie together the various classroom activities. One stated, "to be a truly valuable learning experience, you need the theory with the experience, and then everything seems to come together". However, another facilitator who highly valued the complexity-inspired consolidated teamwork checklist, nonetheless thought that only one pair of conditions ought to be focused on in any single classroom activity.

Several facilitators thought that giving the students readings and teaching them the ideas explicitly was not as effective or important as incorporating them into activities:

> Rather than giving them a reading or something else to read that, you know, some will, some won't…and some will come to class and just sit there and absorb just by osmosis…[it would be better] to take that information…that you want to provide, and either through class activities or structure or something, give them the background information that way.

A related issue that arose was whether or not *any* theoretical ideas ought to be introduced in a didactic manner. During the focus group discussions in particular, facilitators wrestled with this issue. On the one hand, several of the facilitators thought that the students, especially those who were less academically successful, could benefit from the "nurturing structures" provided by the consolidated teamwork checklist's conditions and other complexivist concepts (for instance to guide their reflective assignments).

On the other hand, the course was based on a facilitation model, which emphasized dialogue rather than, as one person put it, "lecture-based learning". This led many facilitators to think that they ought to focus on asking questions rather than giving answers. One suggested simply giving students "the topic and [saying] 'Let's just go for it…What do you think?'...Let it emerge". Another felt that what was most important was not any particular *content*, but rather the *process* of interdisciplinary teamwork and learning to ask questions. Interdisciplinary health practice is complex and unpredictable, she said, with no easy right or wrong answers.

> And this is why I feel it's so important to teach the students to ask questions. Because I can teach content, but I can't give you all the information you need to know to take that information and apply it.

Interestingly, one facilitator made a conceptual link between the complexivist ideas and the course's non-didactic, facilitative orientation:

> I think that the [complexivist] concepts would be particularly helpful for people who are moving from an experience with actually teaching into an experience of facilitation because I think that holding things in balance is one of the differences between teaching and facilitating. Because when you are teaching you've got stuff to present and you want to find out how the people get the stuff. Whereas in facilitation, the way I see it…you are creating opportunities for people to learn but they are very much in charge of what they get out of it…what they put into it and what they get out of it.

This observation articulated an interesting tension between, on the one hand, the desire to 'transmit' complexivist ideas to learners, and complexity's own view that learners construct their own knowledge in a self-organizing (rather than externally determined) manner. (This point is discussed in more detail in the reflection section.)

Time Pressures

Finally, many of the facilitators, both in their individual interviews and in the focus group, said that they lacked sufficient time and opportunity to incorporate the complexivist ideas significantly into their day-to-day classroom activities. One confessed that although the ideas influenced her interactions with students, she did not reference the consolidated teamwork checklist very often in class. Indeed, she said that the students rarely used *any* of the various checklists and other teamwork resources: "I didn't hear many students using them explicitly."

Another facilitator described the situation in the following way:

> I didn't really pull a lot of that out in the class. Because I felt we were just struggling to make up for the lack of attention…the attention that I was not giving them early on. So I felt that we were struggling to kind of catch up…The additional information about the complexity, I found like a bonus. But for somebody who hasn't done it before and then to put in the extra component, I'm not sure…

A third made a similar observation, but also suggested a possible remedy.

> I thought it was a very good theory to showcase to the students but unfortunately…being a first year facilitator and just trying to keep up and trying to make sure the students got the basic information first, I didn't have the opportunities as many times as I would have liked…Maybe it would have been a good idea, after the first time we talked about the theory, maybe we could have actually had one 'sit down' with everyone that was involved and just kind of threw ideas around. I don't know if everyone would be open to this or not. Because over e-mail it's too easy to forget…You want to contribute but you just don't have it at the top of your list.

Facilitators Supporting Facilitators

A number of other facilitators echoed this suggestion about meeting earlier in the course to discuss the complexivist ideas and possible classroom applications with other facilitators. One observed that she needed "a bit of a course in complexity…what I would really value in the orientation would be at least a couple of sessions where we just talk about how to apply, how to bring home this within the course". "Maybe the only suggestion I might have is just a little bit more immediate follow up, like meet[ing] as a focus group after the first week", said another.

This sentiment came up again during focus group, which took place several weeks after the end of the course. At that event, the facilitators agreed that they would have liked an earlier group meeting among the participating facilitators to discuss the complexivist ideas and concrete ways to incorporate them into classroom activities. The best time, many thought, was after the first few classes, once they got to know their student groups a little better.

What was most intriguing me about this idea was how it enacted the very principles of team learning and knowledge-creation we were trying to communicate through the course. As one facilitator put it, "here we are trying to create this experience of interdisciplinary teams and yet we've got these people facilitating it who could be benefiting from that." In particular, the facilitators felt that by sharing and building on each others' diverse insights, they could all benefit and develop better classroom activity ideas than they could working independently.

7.3 The Relevance of the Complexivist Ideas for Interdisciplinary Health Teamwork, Practice and Pedagogy–Specific Conditions

As discussed above, while reviewing notes and transcripts from the interviews and focus group, it seemed to me that the best structure for organizing the data was by the ideas themselves. I have therefore organized the next three sections according to the consolidated teamwork checklist's complexity-inspired conditions for supporting complexity in social collectives (*diversity* & *commonality*, *decentralized interactions & organization*, and *openness & constraints*). However, it is important to note that here these conditions serve mostly as a point of departure; the real focus of the following sections is the new insights and ideas that emerged in relation to each of the conditions.

7.31 Diversity & Commonality

Diversity

All facilitators immediately recognized *diversity* as something crucial to interdisciplinary teamwork in both practice and educational settings. Several said that their primary goal during the first few classes was to encourage students to articulate their diverse personal and professional insights. In some groups, students were simply afraid to speak up. In others, strong personalities would tend to dominate discussions. Many students also saw dissent as something undesirable, which stood in the way of "getting things done".

Perhaps the biggest challenge for facilitators was to disabuse students of the notion that thinking alike and coming to quick decisions were the key to good teamwork. As one facilitator put it

> …at the beginning of the course I noticed that a lot of the people in their feedback to one another…. [would say] 'Oh, we have tons in common. So we tend to agree on things easily'. And really kind of not wanting to look at that diversity. Which I found really interesting…[It] wasn't balanced… saying, you know, 'We may not have always agreed with one another but we could appreciate that other person's point of view'. Which was a much better balance…[This experience] helped me to kind of understand the importance of the two, the diversity versus commonality.

A large number of the facilitators specifically cited the complexivist readings from Surowiecki's *The Wisdom of Crowds* as effectively articulating the value of diversity in social collectives. As one put it,

> Just the simple article [by] Surowiecki, when we are talking about having the different roles and about ensuring that that idea that the skeptic or the advocate is an extremely essential role. It does drive [the point] home, because in society we value people that agree with us, we value uniformity. And so in school, students are taught to agree.

In one case, the reading led a facilitator to regularly ask students, alone and in pairs, to reflect on ways to enable the expression of diversity in their groups. Another said that her students appreciated the Surowiecki readings; however, she wondered whether they had much of a long-term effect on students' team behaviour, since some teams continued to come to decisions too quickly.

The particular condition of diversity also elicited some interesting new insights from facilitators. One drew a link between the concept of diversity and the course's facilitation philosophy. Good facilitators, she said, need to have a passion for what they do and express their unique strengths. However, they also have to appreciate this quality in others and not assume that "they just don't get it" when there is a difference of opinion. With students it means trying to understand where they are coming from and "truly recognizing that learners are learners" rather than as stubborn or resistant to learning.

Several also highlighted the importance of listening. One in particular offered the valuable insight that the issue of diversity really encompasses two problems: One is to get people to speak; the other is to get people to *listen*. This means that team members need to ask themselves "Can I learn to listen, actually hear, and fill gaps in my own knowledge". It can be scary, he noted, for professionals to "step into ignorance" and ask others to explain and contribute, since "we tend not to trust what we don't understand". Interviews with other facilitators confirmed both that listening skills were crucial on interdisciplinary teams and that such skills were frequently lacking.

Commonality

The condition of commonality also resonated with facilitators, though less dramatically than that of diversity. Several, for example, said that teams did indeed require for some sort of common knowledge or language to work effectively. One believed that health professionals' common language lay in the patient; it was the patient's concrete health situation that forced team members to appreciate the relationality of their knowledge and bring together their diverse health-related insights.

Another facilitator pointed to two different sorts of experiences for breaking down professional barriers and cultivating commonality in teams. The first was a crisis situation; in her experience, interdisciplinary teams pulled together most quickly and effectively when faced with a crisis. The other experience that fostered commonality, in her view, was collective arts-related projects. People with differing professional views, she felt, rarely got anywhere through direct discussion. But they could get beyond such oppositions if they participated together in a collective artistic activity outside of their regular duties, such as creating a mural or watching a movie. She cited a concrete example of this approach from Japan:

> [J]ust this past week [I] read an article from a nursing instructor in Japan, talking about introducing nursing students to the concept of

> teamwork and the strategy that they used was to have the students break up into groups and pick…after they had some information about working in teams…pick a menu item, a Japanese menu item and talk about how that menu item could represent aspects of teamwork…And part of their rationale for using a menu item was that sharing meals is such a predominant method and site for relationship building in Japanese culture…and one of the things they commented on in the reflection on it was that the most common traditional Japanese presentation of food is every item separate on the plate. So all of the dishes that were picked by the groups of students involved items being put together.

During this discussion, I commented that her examples show how diversity and commonality are not necessarily opposites and how cultivating commonality can actually nurture the expression and enactment of diversity (for example, a common arts-based activity facilitating teams' expression and integration of diverse ideas). She said that this accorded very well with her belief system and its emphasis on paradox and complementary tensions.

A third facilitator offered another example of the difficulties involved in cultivating commonality—this time, with a negative illustration. He described how a manager at his hospital regularly moved employees around among differing positions. Although the manager's intention was likely to help them gain knowledge of each other's roles—and thereby build commonality—it wound up having the opposite effect, since people lacked the time and familiarity required to build trust and relationships. These three facilitators' insights led me to examine differing sorts of commonality from that of knowledge—for example, commonalities of interpersonal trust and relationship—a topic I examine more fully below.

Consensus

An important issue related to the condition of diversity and commonality in interdisciplinary health teams is that of consensus-based decision making. In the first action research cycle, I problematized the prevailing notion in the healthcare literature that interdisciplinary teams ought to work on the basis of consensus. I argued that expecting team members to 'think alike' and learn each others' differing 'conceptual maps' was both unrealistic and undesirable. I argued that instead of looking for consistency in individual team members' heads, we ought to look for it 'one level up', in the coherence of teams' collective actions.

Many of the facilitators shared my skepticism with the notion of consensus. One said that teams should not try to think in the same way, but rather work towards a common goal. She also pointed out the danger of "manipulated consensus". Indeed, she offered her student teams the following guidance: "I don't want you to agree too soon. Take time to think of implications of agreeing. Get rid of pressure to decide and conform". Another offered similar warnings of the danger associated with the idea of consensus:

> [N]ovice teams and students tend to value the fact that they agree right way and they tend to use that: We're a good team because…we all agree. And so it became a way in which to try to break down that myth, that just because we agree we are a good team.

A third facilitator thought a voting system might be more appropriate than consensus for some sorts of decision-making. She also pointed out that in practice individuals on health teams find way to get around decisions they disagree with. One example she offered was how a nurse, who disagrees with a less experienced resident physician's decision to send a patient home from the hospital, might delay the administrative process for a day until a more experienced physician is present.

Related to the issue of consensus, one facilitator pointed out the need for professionals on teams to recognize their limits: "I don't think people do that enough. Especially if you're in a profession where…you've been taught that you need to know everything to function successfully. But we also have personal constraints." Because individual professionals can't know exactly what the others do, it was more important, she felt, for team members to open discussion among themselves:

> [B]ecause you told me what you do, doesn't mean that I understand it. But if I ask you a question and say, 'you know in this situation you would contribute this, is that right?'. 'Well no'. 'Well tell me then exactly how you might contribute to it'. It's a dialogue.

Yet another useful insight contributed by a facilitator was the idea that, for her, consensus was more about process than outcomes. It was not necessary to 'think alike'; rather, what was important was that all team members be allowed to make their *differing* contributions, and that these contributions were brought together into some sort of coherent action plan.

> [T]here are lots of different ways that people use their own strengths and abilities to contribute and…have a chance to experience that and see it in action…to me, what consensus is, is that whole process of having the discussion, looking at the different perspectives and

> coming up with a composite something or other at the end… it may not be the right word, to capture it… but what it captures is the sense that everyone can contribute.

References in interdisciplinary literature to "blurred boundaries" were, in her opinion, misleading, since it implied a certain "mushiness" and that team members ought to become more alike. Instead, she thought that interdisciplinary team members needed to preserve their difference, or "autonomy', expressing fully their own particular profession's perspective, while at the same time finding ways to coordinated their contributions with others'. To illustrate this point, she drew upon a quote taken from stakeholder consultations that she herself conducted with healthcare workers on the topic of interdisciplinary teams: "we don't need cross-training, we need cross awareness".

The preceding insights from facilitators support the contention I made in the first action research cycle, namely, that the requirement for commonality in interdisciplinary health team members' knowledge is much smaller than most of the relevant literature supposed. Certain commonalities of knowledge related to basic health concepts, patient history and hospital procedure, for example, might indeed be quite important in teams; the much more ambitious and extensive requirement of learning each others' 'conceptual maps', though, was probably not.

Trust

However, the interviews and focus group discussions pointed to another, unexpected form of commonality that did seem essential for teams to work together effectively: Trust. Furthermore, this was a condition that I had not expressly identified in the consolidated teamwork checklist and its complexity-inspired conditions for supporting complexity in social collectives.

The facilitator who first pointed this fact out to me had several insights to share related to the issue of trust. He felt that it was simultaneously one of the most important, and difficult, things for interdisciplinary health teams to achieve. Trust is particularly difficult to achieve in interdisciplinary teams because "[w]e tend not to trust what we don't understand". One of the keys to developing trust in such situations, he said, was honesty and "doing the job that you say you will do". This sort of reliability is crucial for trust to grow in situations where people cannot fully understand others' knowledge and actions—especially in health care situations where lives may be at stake. A second facilitator echoed these points:

> The farther away you are from someone's field, the more it is difficult to trust them…but the more it's needed to trust them…There has to be trust between professions that they will do what they said they will do…And for an interdisciplinary team to work well, there has to be an incredible amount of trust

The first facilitator came up with several ways to incorporate this idea in his pedagogy. For example, he planned to have students reflect on questions such as "Did you feel at any point that you did not trust others or wanted to control the process?" with the aim of helping them to recognize any problems they had with trust, and hopefully to find a way to grow. He also related the issue of trust to the conditions of diversity (trusting that others have something valuable to contribute and listening to them) and decentralization (enacting trust through a sharing of power).

Other facilitators provided concrete examples of the value of trust in the student groups' activities. One observed "the groups that did trust one another worked better…because they could ask…felt free to ask questions". Another echoed this point about trust enabling teams to give and take feedback in a more constructive manner:

> [S]uccessful groups in our class, the most successful ones were the ones who actually could have some negative things to say and they were all OK with it… even in their reflections they said it was really hard to give feedback. And it was hard to receive it. But it was OK…my theory and my guess is that it's because they built up a trust among one another and they knew they could trust one another.

Interestingly, several facilitators also pointed to a potential danger related to the issue of trust. As one put it, "group adherence can be dangerous as well", since it may lead teammates to not criticize one another's ideas. Another said that she observed such excessive trust in the way some health professionals constantly deferred to physicians. It seems, then, that trust has an important role to play in interdisciplinary health teams, for example, in facilitating constructive criticism and coordination of diverse contributions. However, it presents some dangers as well.

7.32 Decentralized Interactions & Organization

The conditions of decentralized interactions and organization, from the consolidated teamwork checklist, also struck a chord with facilitators—though again, as we shall see, they were able to identify a number of gaps in the ideas and suggest ways to improve and elaborate on them.

One facilitator appreciated the insight that in interdisciplinary teams people's ideas, and not just their bodies, need to interact. She applied this insight to her own work context, lamenting the territoriality and lack of awareness among differing sorts of health and welfare services: "No one else knows what they [the others] are doing". Another said she specifically liked the explicit complexivist articulation of how a group's members could build and expand on one another's ideas such that 'more than the sum of the parts' solutions were achieved. As discussed above, members of the focus group applied this reasoning to their own pedagogical development, when they discussed how it would have been helpful for them to interact nearer the beginning of the term in order to share ideas about using complexity in the classroom.

Decentralizing Power

With respect to the issue of decentralizing organization and power within groups, the facilitators also had a number of observations to share. Several saw over-centralization of group processes as particular "dominant" individuals took control of groups:

> I think 3 out of the 6 teams, there were 2 or 3 very strong people that just took over the whole thing. And they were the same disciplines in each group…it was medicine and occupational therapy [that] were the two strong ones…it was a struggle…just to get them out of group think.

> [W]e saw in our group that didn't work…they had that lack of balance between…centralized and decentralized…they generally ended up going to the dietician or to the doc, the med student.

Another facilitator made a link between the degree of specialization of various professions and their capacity for power sharing and decentralized teamwork:

> The people who I found were the most adaptive to the course itself were the O.T's and maybe that's because of their field itself. Like occupational therapy in and of itself is…a huge area of study and it incorporates all aspects of medicine…But the ones that were more specialized like nutrition, medicine…the more specialized areas…they're the ones having problems.

Interestingly, the speaker was herself in medicine.

One particularly experienced facilitator felt that students' professions and clinical experience played *some* role in such group dominance or over-centralization. As a result, he always had his students introduce themselves and their interests at the beginning of the course without talking about their profession—so that their first impressions of one another were unmediated by professional hierarchies.

However, he also felt that professional background played a relatively minor role in the phenomenon of group dominance. More important, in his experience, was personality. Furthermore, he noticed that the students, mostly in their early twenties, were generally more concerned with making a positive impression on each other than with professional hierarchies.

Don't Forget Individuals

Indeed, the issue of the individual and individual personality was one that came up several times over the course of my research. One facilitator thought that the complexity-inspired consolidated teamwork checklist, with its focus on team learning and dynamics, paid insufficient attention to individuals:

> [O]ne thing I found…looking at complexity…well it doesn't really provide a good—and maybe it does and I just missed it in the literature…I mean individual attitudes and individual people, and their individual personalities can really wreck the group dynamic. And I wonder where that comes in when you're looking at complexity.[6]

She went on to provide concrete examples of how individual psychology issues may play an important but unnoticed role in teamwork:

> [T]hinking a bit on the psychological level, people have these unconscious thoughts about being an individual and they don't want to be part of a group because they want to exert their individuality. They don't notice how their individuality affects other people, then it's going to affect the group. And that's why I said in the beginning we take it for granted, that we work in groups all the time and there's certain aspects of us that contribute to that group and the way that group functions. And it's difficult to look at. Especially if you won't like what you're going to see.

Patient as Team Member

Another gap in the complexivist ideas pointed out by the facilitators was the omission of the patient, or client, as a member of health care teams. In fact, this is something that health professions in general are currently wrestling with, namely, the importance of a patient's own knowledge and volition in his or her healthcare planning. Patients' families may also play an active role in their care. One facilitator gave an illustration of how she addressed this issue in her own practice with families of children with speech issues:

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[6] As we shall see, this observation of had more to do with how the complexity literature had been interpreted and applied in the consolidated teamwork checklist than with the complexity literature itself. In Chapter 8 I describe how this literature does in fact stress (arguably more than any other educational discourse) the need to comprehend multiple levels of learners, including that of the individual.

> You've got a body of knowledge: You, your child, your structures, your teams, your time constraints. I have a body of knowledge: Speech language pathology, treatment, interactions. Now they're separate and we put them both together and we're both experts and that child will not fall through the cracks if we share the body of knowledge. And I think that kind of information…is what they [students] needed to hear about the…'You don't have goals, unless the patient, the client has goals'.

Equal Power?

One of the most controversial topics relating to this pair of conditions (decentralized interactions and organization) was the precise division of power: Should all team members have equal power? Although much of the literature on the topic of interdisciplinary health teams asserts equal power as the ideal, many facilitators thought this both overly simplistic and unrealistic.

One observed that the power of a team member's opinion depended on the specific health problem faced and its relation to their particular specialty. Two others noted that, in practice, physicians' opinions often carried more weight than other professions', since it was they who were most responsible (legally, administratively and morally) for ensuring appropriate care for their patients: "I think, in practice, that the doctor's opinions carries more weight because they're signing it. But in practice these disciplines are influencing each other."

The idea of various professions having an influence or contribution to make—but perhaps not on an equal basis—was expressed by several facilitators. One said

> I'm very fortunate to work with a group where we do not really do the whole hierarchical thing. Each of us [has] our own responsibilities and we have someone that we report to, but it's not so structured. It's not…set in stone.

When asked about whether the division of power was perfectly equal, however, she responded, "No, no, no…there's no such thing… But at least if everyone has a chance to contribute, that's what makes the big difference".

Another facilitator had thought a great deal about the issue, both in the context of teams and wider society:

> [I]n a team situation it's more important that everyone be equally free to contribute whatever they have that's appropriate, rather than that everyone have…two minutes to say their piece…[I]n society I think justice is more important, or fairness is more important, than equality…than sameness. That we all be treated in a way that is appropriate to where we are, and who we are, and what we're going though, is more important than that we all be treated in a way that is exactly the same. Because what is good for one person may actually be harmful for another person. So equality is not about sameness. It's about appropriateness.

Significantly, he did *not* work in one of the traditionally more powerful health professions.

Power vs. Influence

Another valuable insight this facilitator offered was a distinction between *power* and *influence*; in interdisciplinary health teams, he said, professionals give up power in order to gain influence:

> Another pair of terms that I've heard used together before is power and influence. In power I *control* what happens and [in] influence I *affect* what happens. And if I'm willing to think in terms of effect, then I know that there will be other effects. And then I can be open, so I don't have to give up my input and my influence on what's going to happen with the client, by allowing others to have an influence as well. But if I think in terms of power and sharing power…there's only so much power and we've got to figure out who has what. And with the word influence, opens it up much more broadly than the word power…If someone is in a position where they're attempting to exercise power, then others could either fight back or acquiesce. But if they're thinking in terms of influence, they might find it easier to bring what they have together.

In addition, he linked the concepts of trust and influence:

> [T]hinking in terms of influence requires trust. Because [I] trust others to accept and take seriously my input. I have to trust their input because I don't have the final control over it. I don't have the final say.

In contrast, people on teams who do not trust will try to hold on to power and micromanage others. The issue of power relations mattered most, he felt, when trust was lacking.

Finally, he linked the preceding ideas to complexity science, saying that influence "fits complexity better. Power is more mechanistic…Anything that's more fluid fits complexity better…And no one is excluded in a complex system. Everyone has an influence in the outcome."

Other facilitators also made the link between interdisciplinary teamwork and a lessening of power tensions. One noted that within successful groups in her class, "there is an unconscious giving up of power…[N]o one can work alone, you need to all come together and move as a unit". Other facilitators made this connection in a negative sense: One noted that expertise was often used to gain power and exclude others, while a second observed that ineffective teams in her class were unable to give up their individual power.

Two other facilitators took a more psychological approach to this issue. One speculated that people resisted interdisciplinary practice because it required a redefinition of professional identity:

> [P]erhaps that's where the power struggles come from…you've got to re-establish your power or your…freedom to be who you are, to you define yourself. You know, you've got to go back to that definition of yourself. But, it's really…one of the most free things in the world. Because…you open yourself up to learn, to hear what the other person says…

The other thought that interdisciplinary practice was not so much threatening to practitioners as strange or foreign to them. Furthermore, the problem was not so much the principle of teamwork (which few objected to) as its enactment. Many physicians she had met, for example, had hired other professionals based on their interdisciplinary team qualifications; however, few were prepared to accept the reality of power sharing in practice.

This latter facilitator also framed the issues of power and influence in terms of professional autonomy. Interdisciplinary teamwork required a less atomistic notion of autonomy, one in which a practitioners balance their professional specialization with their team responsibilities—what she called the "social side" of autonomy. She observed that it was usually the more mature, experienced students who understood this different sort of autonomy and that individual specialization and team organization, or coherence, are not mutually exclusive:

> [I]t takes a certain level of maturity to be able to do that in a group, in a constructive way…there is something in a group when a group can actually foster the diversity of its members or you know, actually help people be more uniquely who they are in the group setting.

Asking Questions

Another facilitator brought up a deceptively simple issue that directly related to the preceding topics of idea interaction, power and influence, and balancing individual specialization with more collective team responsibilities: Learning to ask questions. She believed that this was the most important teamwork (and healthcare) skill that students could learn.

> [It is] important to say that there are some things you don't know and you have to 'poke'. And if you don't know, somebody else does. And that's OK…[T]here comes a point in time that when we need to go further, our knowledge base doesn't allow us to go further and we hand it off to somebody else, who [does have] knowledge of this.

In her view, assuming that you understood a situation or what a person meant without probing deeper was anathema to effective and ethical care; it amounted to saying that you already knew everything that the other person knew, and reducing what might be different to a simplistic familiarity.

> And this is where I keep coming back down to: If you say 'assume' or 'I think', you need to ask another question…Because you're going to end up being a much better clinician or stronger person [and] more knowledgeable by asking those [questions], by saying, you know, 'Well I don't know'.

Effective interdisciplinary health team members, she believed, are those who can truly 'open' to others, who acknowledge that they do not know everything, and who are confident enough to ask 'dumb' questions. The facilitator provided a concrete example from one of her student teams:

> [T]here was a physiotherapist in one of the groups and that group did very, very well. She said…'I don't have a lot to do with this problem', this woman in chemotherapy…but she took on the role of asking questions, which was an excellent role. And so having someone who's not involved and may not have the information…put her in a position of asking questions, without be[ing] threatening.

Facilitation vs. Didactic Instruction

In my discussions with a different facilitator, we applied a similar insight to the role of facilitator within INTD 410. While traditional instructors are expected to be experts and 'have the answers', facilitators have a very different role. They may provide some general guidance, but they are more likely to ask provocative questions than offer definitive answers. She found this a difficult role to get used to at first, for both herself and the students.

> [It was] not a very intuitive concept for me because when I was a teaching assistant in my master's program, I was the expert, or I was considered the expert. I didn't feel like one, but I was looked upon as one. And I remember in our training sessions for this facilitation thing,

> which I thought was great, they emphasised the fact that we're not there to talk to them, or talk at them, or teach at them. We're supposed to facilitate, we're supposed to help them, guide them along, you know on their own… No one can really be the expert. But the thing is though, the students kept forgetting that.

Institutional Contexts

A large number of facilitators applied the complexivist concepts related to decentralized interactions and organization beyond the course to their institutional settings. One used them to reframe her understanding of reform within her own faculty; another to describe workplace power dynamics and potential conflicts between older "bosses", who were accustomed to centralized power and information flows, and younger healthcare workers who expected a more decentralized system.

One facilitator used to ideas to articulate how current healthcare reforms in his region were being imposed in a mechanistic, top-down manner, with an emphasis on "measurable goals". He felt that this task-oriented approach undermined the development of the very personal links and relationships that supported effective teamwork. A more appropriate approach would be one that paid more attention to process, imposed fewer constraints, and allowed more local decision making.

Two others said that governments, professional associations and universities were now beginning to support the idea of interdisciplinary practice, but that "serious support" and actual health practice in many areas lagged behind. As one put it, "the interpersonal approaches that are inherent in what they are saying those people need to develop [in interdisciplinary teams] are not the way that they operate themselves."

Finally, brainstorming together, one facilitator and I tried to draw an analogy between interdisciplinary health teams and interdisciplinarity in universities. She believed that in teams, what persuaded professionals to give up a little power and work together was better patient care. That is, the concrete reality of patient problems and "patient centred" philosophy necessitated interdisciplinary teamwork.

We thought that universities might be in a parallel situation: The concrete realities of the problems they faced—social, environmental, political, and so on—seemed to be pushing universities towards interdisciplinary research and teaching. Individual faculties might therefore be motivated to give up a little of the power provided by academic 'silos' in order to address real world problems in more appropriate, original and innovative ways. Might such a movement be related to a "problem-centred" philosophy of higher education?

In any case we both arrived at the view that in order to further the development of interdisciplinary knowledge—whether in healthcare or universities—a renegotiation of power was required. Knowledge that was 'more than the sum of the parts' could be created, but first each discipline had to acknowledge 1) the limitations of its own paradigms and 2) its connection to other disciplines. As one facilitator put it, we "cannot survive without others' expertise", or without becoming part of "something bigger".

7.33 Openness & Constraints

In Practice

Facilitators employed the complementary concepts of openness and constraints—best captured in the phrase 'enabling constraints'—in a variety of ways. One applied them to her own practice, describing the way meeting agendas can simultaneously focus teams on the issues and elicit innovative solutions. Another linked the concept of openness to the need she saw for health practitioners to be genuinely receptive to the differing perspectives of patients and their families, as well as other professionals:

> [W]hen you're doing something and you're involved with families or you're involved with clients or you're involved with other professionals…You never make the other person wrong…You open yourself up to learn, to hear what the other person says.

In Class

Several recognized the role of enabling constraints in their student groups. One noted the more successful groups were those that established at least a few group norms, such as regularly giving one another feedback. Another highlighted the value she saw in the various teamwork checklists, organization tools and other enabling structures provided by the class manual and activities:

> This course, the whole value of it is that we give them…that structure, that framework, those constraints…[and saying] 'that this is how you may want to approach it when you yourself are out there in the real world, having to work with interdisciplinary groups'…If we don't give them that structure right away, they're going to get lost. And I think that's what happened to that one group; they did not either appreciate the structure or the examples of structures that we gave them, and they just thought that it was something that they could do on their

> own. And then it was in the end when they realized, 'oh-oh, wait a minute, it's not just like a completely intuitive thing. There's more to it than that'.

In Facilitation/Teaching

A third facilitator applied the ideas of openness and constraint to how she and her co-facilitators organized their classes:

> There needs to be organization in chaos, as far as I'm concerned. Especially when you're teaching. I think that's really important…We could [each] choose to carry out our part of the class the way we wanted to. But we always had that agenda on the board. So that at least we knew where we were going, and we knew that we had to impose time limits, let's say, to talk about this one topic. But under that topic we could choose to approach it any way we wanted. And it worked well because it ensured the class moved smoothly and that the class was interesting.

Indeed, she felt that their conduct served as a model for student groups to emulate:

> You could see the parallel learning in the groups…us modeling that…where you saw the groups adopting that stance…Two or three groups were really good at imposing a time limit on the group, so that they could work within that time limit. And they usually came to whatever decisions [they] needed to make…they weren't left floundering. And then you saw the one group [that] seemed to do badly in everything. They never ever gave themselves an agenda to follow.

In Curriculum

In the focus group, facilitators reiterated the need for enabling constraints like theories, checklists and other structures, especially for students who were struggling—as one remarked, "[i]t's one of those openness and constraint things". However, there was some disagreement on the most appropriate balance between openness and constraint in the particular context of INTD 410.

Some leaned more towards constraints and favoured including explicit theoretical concepts relating to interdisciplinary teamwork, for example, "making an attempt to structure in some of the complexity ideas". Others were more inclined to the openness side, and thought facilitators really ought to work with whatever issues and insights spontaneously emerged from discussions with students. One placed a lot of emphasis on uncovering and critically examining people's assumptions about the course and teamwork: "I tell them, 'spit it out of your mouth and look at the words you just said. So you can actually see what it says'."

Still others thought that the course was too short to rely on such unstructured, spontaneous approaches. "Not too much emerges in five weeks", said one. Towards the end of the focus group discussions, one facilitator articulated a balanced view that sought to reconcile the previous views:

> I think as facilitators in a course where you want things to emerge, you have to be pretty structured. And so you provide the structure. [That] doesn't mean you lecture, but you have a really clear idea of where you're going and I think that we do that as we go along; it becomes clearer as we go along. But …I don't think as a facilitator you can walk in and expect [that] this group is just going to emerge and you're going to figure out how they're doing it. I think you need to have a good idea ahead of time how it's going to emerge and then…you'll have surprises.

An Innovative Idea

Part way through the course, one particularly interesting idea for an 'enabling constraint' emerged. A facilitator had taken the complexivist idea of nested systems and used it to create a structure for her teams to use to approach their case scenarios. I thought it was a great idea and shared it with the other facilitators through the following email message (one of several groups emails I sent out to the facilitators during the 5 week course):

> Re: one interesting idea for supporting teamwork
>
> Hi Y'all,
>
> This final week, I would like to talk about an interesting idea that one of you shared with me a few days ago. It concerned a structure for approaching patient scenarios, one that helped teams contribute diverse ideas without 'stepping on each other's toes'.
>
> Basically, the idea was to have the students divide up their initial comments or contributions concerning a patient into several explicit categories, for example, physiology, environment, safety, family/social context, etc. (From a complexivist perspective, I might call these the different levels of complex systems relevant to a patient's health.)
>
> When students simply put their ideas out WITHOUT this structure, the facilitator found that they were more likely to get confused and defensive. This was because students tended to assume that any idea that was different from theirs must be a challenge.
>
> But WITH this structure, they tended to be more receptive to others' diverse ideas, since they saw how these ideas were concerned with different areas relevant to the patient's health. In effect, the structure prompted students into seeing a bigger picture.
>
> It is important to note that this is a two-stage process. First, the students identified categories and put their ideas 'out there'. Then,

> second, they started to look for connections between ideas and strategies for making treatments complementary. If they started to look for connections too soon, or without a structure/categories, then the facilitator found that things got too messy and did not make sense to the students.
>
> I really like this approach, because it covers so many of complexity's conditions for smart teams. First, the category structure can be seen as a constraint that enables openness. Second, it provides a way to express diversity, as well as a common reference point (or commonality) to focus discussions. Third, it offers a way for ideas to 'bump up' against one another, leading to new and better ideas. Finally, this approach points to how teams can 'emerge' as a sort of collective thinker. That is, it shows how team members can, by adapting to and building on one another's ideas, come up with collective solutions that transcend what they could have come up with working independently.
>
> That's it! I hope your final week of class goes well.
>
> Angus

The facilitator who developed this very practical enabling conceptual structure offered a variety of insights and experiences relating to it. One concerned the relationship between parts and wholes in patient care. A patient or case scenario presents itself to practitioners, she stated,

> as a whole; it's presented immediately as a holistic thing and the key is to not…jump to a simple conclusion but to analyse out all the different parts and then bring [them] back [together] and coordinate a treatment plan…I relate it back to what I do clinically. A person, a family comes in with a presenting problem. I break it down into as many pieces as I possibly can. And then we start building it and making those kinds of connections… And not all professions will contribute to it perhaps…but they will contribute more in other areas. But recognizing that each section is a part of the whole…And if you're looking at the whole and contributing to the whole, then you have to recognize the different sections and you have to recognize the different people that are contributing to it.

In the specific context of INTD 410 and her facilitation of student groups, she added,

> I can't even imagine working without that kind of structure. And as I watch[ed] the teams work, they were pulling out all kinds of ideas but just didn't know what to do with them. And after I went and talked to you, I really went back and…basically suggested this framework. And it was interesting in [the end of course evaluation], those who believed in it and who had really practised it, you could tell, boom, they were right on the money. The teams who had never worked that way felt

> that they needed the freedom to do, freedom just to throw things out there, certainly had a more difficult time.

In subsequent interviews and the focus group, several facilitators thought this 'nested complex systems' tool would indeed help students, both in the class and in their subsequent professional practice. One remarked,

> I think that's a great, you know…very complex approach…I mean you're starting from a cellular level from a medical point of view…that's where the lab guy comes in. Then you've got the organ, then you've got the limbs…. And certain disciplines will have expertise in several of those components, cause that's just the nature of their job. Nurses for example, they've got the science background, but they also have more interaction with the family than the physician may have. So they may be able to contribute more to that kind of thing than the physician. And that's perfectly fine because that's just how they're trained. And that's just the reality of their job.

She also believed that using this sort of tool would be a good way to stop certain individuals or professions from dominating interprofessional teams. This perspective interested me, since in the healthcare literature, most attempts to lessen personal and professional inequalities focused on socio-cultural issues like gender or professional power and status. The nested systems tool, however, offered a different and complementary strategy: It addressed the issue of inequality by drawing attention to the differing sorts of phenomena studied by healthcare professionals and the necessity of multiple and differing professional insights.

In conclusion, a number of changes and insights emerged through the interaction between the complexivist ideas developed in the first cycle and the facilitators' knowledge and experiences. In the first place, significant changes in facilitators' practices and pedagogy resulted. Their use of conditions such as diversity and enabling constraints to structure classroom activities is one example; the development of the nested complex systems tool for evaluating patient scenarios is another. Perhaps even more important, though, were the insights that emerged from this interaction, insights that contributed to a better understanding of both INTD 410 and what the complexivist ideas and conditions might mean in the particular context of interdisciplinary teamwork.

These insightful contributions include a confirmation of the general theoretical and pedagogical relevance of complexity science for interdisciplinary health teams; a deeper understanding of the significance of the conditions of diversity, commonality, decentralized organization, openness and constraint in this particular context; a problematization of the notion of consensus; articulation and illustrations of the importance of trust and openness among health workers; an exploration of the controversial topic of equality and the tension between power and influence; and a new pedagogical structure for enabling interdisciplinary teamwork based on the concept of nested systems.

In the following chapter, I reflect on major themes among these and other emergent insights, comparing and contrasting them with currents in the wider academic literature.

8.0 Chapter 8: Reflection

The last chapter described insights, critiques, changes of practice and other events that arose as a result of collaboration among myself and a group of INTD 410 facilitators. This collaboration centred on the relationship between, on the one hand, the complexity-inspired ideas developed during the first action research cycle and, on the other, the facilitators' own knowledge and experience of interdisciplinary health teamwork and education.

In this chapter, I reflect on events described in the last chapter, identifying and thinking about major themes and patterns, as well as their implications for future research and practice. The chapter is divided into two main sections. The first addresses the level of ideas, in particular how our collaboration produced new knowledge relating to INTD 410 specifically and interdisciplinary healthcare teamwork and education in general. The second section focuses on the research participants (including myself), the nature of their participation, and their wider professional and institutional contexts.

By dividing this chapter into these two sections, I am *not* claiming that knowledge and the people or collectives that enact it can be separated in any essential sense. However, analytically distinguishing these two different but related facets of the same phenomenon facilitates a more fine-grained exploration of the issues involved.

8.1 The Ideas: Major Themes and Emergent Insights

As we saw in the previous chapter, the facilitators and I found that the complexity-inspired ideas and curriculum developed in the first cycle were quite relevant to interdisciplinary teamwork and practice. Furthermore, by putting together and comparing the complexivist ideas with their knowledge and experience of interdisciplinary healthcare and education, we were able to develop new knowledge. More specifically, through readings, interviews, casual conversations, focus group and individual reflection, we articulated a number of critiques, elaborations and other insights related to the new complexivist ideas, INTD 410 and its curriculum, as well as to wider interdisciplinary healthcare practice in Canada.

In this section, I concentrate on the most noteworthy of these new ideas, that is, those which seem most likely to *make a difference*—both in the sense of changing current practices within INDT 410 and wider health education and practice, and in the sense of differing from or challenging (and thereby contributing to) current theorizations of interdisciplinary teamwork. At the same time, I endeavour to link these evolving ideas to relevant literature. (Recall that action research does not typically begin with an exhaustive literature review, but rather seeks to adapt flexibly and creatively to issues that emerge during research process (Green, 2002; Winter, 2002)).

8.11 Need for a 'Strong Theory'

One of the issues that emerged in the last chapter was the need several facilitators saw for a "strong" theoretical framework that could be used to provide both a justification and an organizational structure for INTD 410 and interdisciplinary practice more generally. Further research on my part revealed that this perception was echoed in the wider healthcare literature, as several authors have identified a need for a better conceptual understanding of the interprofessional relationships, teamwork and learning (Bleakley, 2006; D'Amour et al., 2005; McCallin, 2001). As Canadians Gilbert & Bainbridge (2003) write,

> Convincing both faculty and students about the value of IPE/C [interprofessional education and collaboration] is a major barrier to overcome. The barrier requires that a fundamental issue be addressed, that is, the need for a *robust theory of collaboration*…that can be understood intellectually, challenged experimentally and argued for politically. (pp. 282, 285; italics in original)

Furthermore, these and other authors assert that suitable theoretical models must possess certain characteristics. Both Bleakley (2006, p. 156) and Chatalalsingh & Regehr (2006, p. 36) highlight the need for new learning theories that look beyond the individual and take into account group level learning in dynamic and complex environments. Outside of the specific healthcare context, Senge (1990) has observed that "team learning remains poorly understood" (p. 238), that the diversity of "cross functional teams" makes it "virtually impossible for a shared picture of the system as a whole to emerge", and that "the situation is unlikely to improve until teams share a new language for describing complexity" (p. 267).

A number of authors studying interdisciplinary health teams stress the importance of theories that explicitly address relationships and how teams can become 'more than the sum of their parts'. Øvretveit (1997), for example, writes, "the reality of modern health and social services is that the care we get depends as much on how professionals work with each other as on their individual competence within their own fields of expertise" (p. 1).

Beattie (2003) observes that the "conceptualization of health alliances still appears straight-jacketed by a mechanistic and 'additive' way of thinking" (p. 149). In a similar vein, Leathard (2003) contrasts the "additive model" of interprofessional work, in which "each profession adds its own particular contribution [and] interprofessional practice is defined as the sum of the professional perspectives" with the "multiplicative model":

> However under the *multiplicative effects model*, combined, integrative efforts can achieve more than is possible simply by adding contributions. Interprofessional work can thus generate new potential and enhance the input of individuals whereby professionals thus working together can produce a magic between groups. The multiplicative effects model thus underpins collaborative potential in the belief that the whole can become greater than the parts. (p. 94; italics in original)

Interestingly, in spite of the very complexivist language they invoke, not one of the latter three authors explicitly discusses complexity science as an eligible theoretical framework. The only authors who do explicitly invoke complexity are Cooper, Braye and Geyer (2004), who suggest that complexity can provide a framework for interprofessional health education. As discussed in Chapter 4, however, they use complexity primarily to articulate a non-linear, constructivist approach to higher education; they do not develop any deeper links between complexity and interdisciplinarity teamwork.

Hopefully, this dissertation can contribute to current discussions on the appropriate theoretical framework(s) to employ in the context of interdisciplinary health teamwork and education. Obviously, it offers support and constructive insights for those interested in using complexity science as a theoretical model. However, the data collected in the previous chapter and the above literature suggest that no matter what theoretical model researchers choose to work with, this perceived need for a 'strong' theory has several different dimensions worth exploring. Some facilitators and writers, for example, emphasized the need for a theory for practicing interdisciplinary teams, while others were more concerned with aspiring professionals' university education.

There was also a distinction to be made between practical, pedagogical motivations for having a strong theory and political motivations. Several facilitators immediately picked up on the pedagogical uses of the complexivist ideas in INTD 410, both as background readings and a useful structure for organizing the occurs and particular lessons. Others pointed to its political use, as a means to justify professional, governmental and university support for interdisciplinary teamwork and education. As Sumner (2003) notes, those who seek to understand interdisciplinary relations must look not only to epistemological differences, but also to issues of power and politics, such as whose interests interdisciplinary research serves. Most facilitators and much of the literature, in fact, seem to combine these two concerns, even if they do not explicitly distinguish the two or articulate them in terms of epistemology and politics.

8.12 Beyond Consensus: Bridging Diverse/Incommensurable Professional Knowledge Through Trust

Several new insights emerged under the heading of diversity and commonality, including the importance of listening and the role of crisis and non-work-related activities (such as art or cooking) in promoting commonality. However, the most significant and provocative ideas the facilitators and I articulated involved 1) a questioning or re-examination of the notion of consensus and 2) an emphasis on the role of *trust* among team members. As we shall see, there is also significant support in recent literature for these ideas.

Furthermore, through reflection on these two ideas and their implications for teamwork, an additional insight has arisen. This insight (developed below) combines these ideas in order to articulate a novel view of interdisciplinary team thinking—a view that did not rely on the assumption that different professionals must achieve consensus in the sense of 'thinking alike' or learning one another's "conceptual maps". Namely, that interpersonal trust provides a kind of commonality or 'glue' which can bring team members together and their ideas into coherent—if not internally homogenous—collective plans, treatments or 'thoughts'.

Beyond Consensus

In the first action research cycle, I described how both the course readings and wider literature on interdisciplinary health teams—whether of the practical or socio-cultural school of thought—tended to assume that disciplinary knowledge differences could and should be overcome through consensus, or getting team members to think more alike and learn each other's professional paradigms. I argued against this approach, claiming that different health professions had differing socio-cultural histories and studied a number of different complex systems—and that their professional 'knowledges' were thus 'doubly incommensurable'.

The overall coherence of team knowledge and action plans should not, I argued, be sought in individual minds; indeed, expecting every individual to become a health 'generalist' would require enormous additional education and training, and negate the value and efficiency of specialization. Instead, team members should take responsibility for their own area of expertise and coordinate it effectively and flexibly with others' areas, so that their actions form a coherent and intelligent whole. In effect, this approach meant shifting the focus from individual knowledge to collective, or team-level, knowledge, something that complexity and conceptualization of multiple, nested learning systems, allows us to do.

In any case, most of the facilitators I collaborated with had practical, rather than highly-theoretical, understandings of interdisciplinary teamwork and decision-making. The effective teams they worked on did come to agreement on ways to assess and treat patients. As we saw in the last chapter, however, when questioned about the meaning of 'consensus', they too had doubts or concerns. One warned of the danger of "manipulated consensus". A second sought to "break down" the "myth" that good teams are those who agree on everything.

A third stressed the importance of knowing your "personal constraints". Health professionals, she believed, were too often taught that they had to "know everything". A more realistic and effective approach was to recognize your limits and open discussion with other team members. A fourth facilitator offered a similar perspective, saying that people on teams needed to learn to "step into ignorance" and ask others to explain and contribute. These insights, I felt, accorded well with the shift from individual knowing to team-level knowing I described above

Another facilitator offered a particularly well-thought out interpretation of this issue. For her, consensus was more about process than outcomes. It was not necessary to 'think alike'; rather, interdisciplinary team members needed to preserve their difference, or "autonomy", expressing fully their own particular profession's perspective, while at the same time finding ways to coordinate their contributions with those of others':

> [T]o me, what consensus is, is that whole process of having the discussion, looking at the different perspectives and coming up with a composite something or other at the end…it may not be the right word, to capture it…but what it captures is the sense that everyone can contribute.

Since the interviews with facilitators were conducted, I have found in recent literature some support for non-consensus-based understandings of teamwork. Indeed, many of these authors see diversity and conflict as a crucial source of innovation in teams. Senge (1990), for example, a well-known thinker in the area of organizational learning, writes,

> Contrary to popular myth, great teams are not characterized by an absence of conflict. On the contrary, in my experience, one of the most reliable indicators of a team that is continually learning is the visible conflict of ideas. In great teams, conflict become productive. (p. 249)

In the context of social work, McKee (2003) observes,

> The problem is not the diversity of our ways of looking per se, but the difficulty we experience when we try to excavate them and describe them to each other and the lack of conversational space wherein such dialogue is welcomed and nurtured. (p. 405)

A number of writers in the specific field of interdisciplinary healthcare have recently offered even more radical and insightful understandings of how disciplinary incommensurabilities, rather than being a barrier to teamwork, are actually a source for collective learning and innovation. Drawing on activity theory, Bleakley (2006) notes that what seems as argumentative talk in team can be reformulated as a source of collective intelligence (p. 153). Beattie (2003) proposes, as a metaphor for understanding interprofessional health alliances, the modernist concept of "thirdspace", which "refers to unexpected juxtapositions, discordances that generate newness…[and] the negotiation of incommensurable differences" (p. 152).

Opie (1997) stresses the importance of recognizing interpretive differences among team members and of exploring alternative conceptual paths (p.12). Further, she writes that "team narratives" are

> not characterized…by well-formed accounts, a single speaker, a 'central subject', or 'proper beginnings, middles and ends'…no easily claimed coherences. (pp. 9, 10)

Nonetheless, viable team narratives or understandings do emerge as each member contributes to a developing "story line about each [patient] which can be thought of as composed by the team as a corporate author" (p. 11). What *is* crucial, Opie (1997) states, is "how members elicit, identify and then work with these differences articulated through narrative to achieve a point of provisional closure (a team plan)" (p. 13).

Trust

Another idea that emerged during the interviews and focus group was the importance of trust for interdisciplinary teamwork. The consolidated teamwork checklist—which was based on INTD 410's pre-existing curriculum materials combined with the complexivist conditions to support the emergence of intelligent collectives—did not explicitly contemplate this condition and so it came as somewhat of a surprise. As described in the previous chapter, several facilitators identified trust as simultaneously one of the most important, and difficult, things for interdisciplinary health teams to achieve, due to people's tendency not to trust what they do not understand. Facilitators also provided concrete examples of the value of trust in the student group activities, for example, the way trust enabled teams to give and take feedback in a constructive manner.

Subsequent research showed that trust had indeed been explicitly articulated as an important condition for teamwork in certain literature. Nolte & Tremblay (2005), for instance, list "mutual trust and support" among the "elements needed for effective team-building and functioning" (p. 8). Drinka and Clarke (2000), in a chapter not previously used in INTD 410, included "building trust" in their chart of the components and variable that influence teamwork (p. 13). San Martin-Rodriguez et al. (2005) list trust among their "interactional determinants of interprofessional collaboration" (p. 141). Indeed, in reviewing the first action research cycle, I noted that I had unselfconsciously written that trust in one another was what helped the INTD 410 organizers, and me with them, work together so well.

Regarding what supports the development of trust in teams, a number of explanations were offered. One facilitator, who had thought a great deal about the issue, believed that it depended on team members knowing one another personally, having experience of the other disciplines, and being able to rely on others to do what they say. San Martin-Rodriguez et al. (2005) linked trust to team members having confidence their own and others' professional competence (p. 141). Schon and Rein (1994), writing on how to work across differing disciplinary frames in public policy teams, write

> To exhibit trust in such a context is to be prepared to act as though your counterparts will behave cooperatively in spite of the risk that they may not do so and in advance of evidence that reveals how they will behave. (p. 179)

Suchman (2006), writing on the contrasting values of *control* and *relation* among healthcare professionals, identified trust with the latter.

> At the core of the relation paradigm is trust. This philosophy accepts that there are sources of order, goodness and meaning beyond one's own creation. This source may be at a collective human level (as exemplified by the consistent performance advantage of well-functioning teams over individuals) or on an even higher order.... Regardless of scale, the basic existential stance in the relation paradigm is one of self-transcendence and receptivity, of letting go of control and remaining open. One's source of existential security might best be characterized as alignment: recognizing the interdependence of oneself and others in a larger order of things and learning to be part of the flow of that order. (p. 8)

Bridging Diverse/Incommensurable Professional Knowledge

Long after the interviews and focus group with facilitators were finished, the two ideas discussed in this section—non-consensus-based understandings of teamwork and the importance of trust—continued to resonate in my mind. The research up to this point had focused largely on challenging the prevailing notion of consensus thinking in interdisciplinary teams. However, this had left me with a lingering feeling that there was a gap in our developing understanding of teamwork. If health professionals' knowledge presented so many incommensurabilities and it was unrealistic to think that they could master one another's "conceptual maps", what allowed them to work together? And work together in a way that was frequently very effective, producing healthcare solutions that could be characterized as 'more than the sum of the parts'.

It was not until I started writing this chapter that a new insight started to take shape. Again, it was based on the two previously discussed ideas:

1) Teamwork based on diversity rather than consensus

> 2) Trust as something that helped individual team members let go of control and their claim to understand everything, and to acknowledge their interdependence and cooperate towards the accomplishment of larger goals.

The idea was that *trust*, rather than shared professional knowledge, was the 'glue' that held teams together. Trust was what enabled individuals to let go of control and of any claim to have 'the big picture', and to build synergistically on one another's knowledge. As a research scientist recently observed in an issue of the University of Alberta's *Folio* publication dedicated to interdisciplinary collaboration,

> In order to have true collaboration you need to have trust. You aren't turning a biologist into an engineer or turning an engineer into a biologist, so you need to trust one another's knowledge. (Cairney, 2007, p. 11)

One way to understand this new insight is through the lens of the complexivist conditions of diversity and commonality articulated in this dissertation. As we have seen, in human collectives, diversity is a source of intelligence; it expands a group's set of possible solutions and allows it to conceptualize problems in novel ways. Collectives also require commonalities; they are the common ground that enables individuals to interact and thereby make use of the diverse perspectives offered. Much of the mainstream literature previously used in INTD 410 emphasized the importance of commonalities of knowledge among team members—thus the push for different health professionals to learn one another's "conceptual maps".

However, this research, and the preceding reflections especially, present a different possibility, namely that trust—more of an interpersonal relationship than a form of professional knowledge—provides the 'commonality' that sustains interdisciplinary teamwork and enables collective intelligence that is 'more than the sum of the parts' to emerge.

Indeed, there seems to be an inverse relationship between commonalities of knowledge and the need for trust. If people on a health team completely understand each other's conceptual maps, then there would be no need to trust others, since each member could judge on his or her own the appropriateness of every aspect of the diagnosis and treatment. On the other hand, as differences in knowledge grow, more and more trust is required, since individuals must rely on the expertise of others.

One contribution that this research offers, therefore, is a new understanding of interdisciplinary team thinking—one that does not rely on large overlaps in different professionals' knowledge. Instead, specialization is allowed and encouraged, and differing professional specializations are brought together into coherent—if not always internally homogenous—collective plants, treatments or 'thoughts' through a different kind of commonality: *trust*.

8.13 Individuals, Groups, Power, Equality, Influence, Relation and Openness

Balancing Individual and Group Learning

A number of issues emerged in relation to the conditions of decentralized interactions and organization. The first concerned how to achieve an appropriate balance between the individual level and the team-level in the context of team learning. As we have seen, a number of thinkers writing in the area of interdisciplinary teams have called for a greater focus on team-level learning in dynamic and complex environments (Bleakley, 2006, p. 156; Chatalalsingh & Regehr, 2006, p. 36). Drinka and Clarke (2000) have also written of the need for a shift in focus:

> Rather than viewing interdisciplinary leadership as qualities in one person, it might be more appropriate to think of it as a system in which the behavior of all team members plays a role. (p. 107)

In spite of these calls, the phenomenon of team learning remains poorly understood. As Chatalalsingh and Regehr (2006) write, "what is underspecified in the literature is the process of how learning and knowledge sharing are enacted within working teams on the front lines" (p. 31).

It thus came as somewhat of a surprise when, as recorded in the previous chapter, a facilitator told me that the complexity-inspired consolidated teamwork checklist, with its focus on team learning and dynamics, paid insufficient attention to individual personality and psychology. Furthermore, as we shall see in the next action research cycle, this issue would reappear later discussions with organizers concerning future INTD 410 curriculum.

These comments led me to believe that perhaps in the developing the complexivist ideas in this context, I had let the pendulum swing too far, from an exclusive focus on individual learning to a nearly exclusive focus on team learning. A more comprehensive understanding of teamwork would, presumably, encompass a focus on both these levels—what Davis and Sumara (2006) refer to as "trans-level learning" (p. 136).

Indeed, understanding interdisciplinary teamwork might require attending to more than just the individual and team-levels. San Martin-Rodriguez et al. (2005), for instance, call for a multilevel approach that embraces not only "interactional determinants" within health teams, but also "organizational determinants" and "systemic determinants" at the levels of the organization and its institutional environment (p. 145). They also stress the need for a better understanding of how these differing levels influence one another.

Fortunately, this multi-level approach fit quite well with the concept of nested learning systems and the other complexivist theories that guided this research. In future research, however, care would have to be taken to ensure that all relevant levels of phenomena were explicitly addressed.

Power and Equality

The second issue that emerged in relation to the conditions of decentralized interactions and organization concerned power and equality. Power and equality are controversial topics in interdisciplinary health team research. Healthcare has traditionally been organized in a fairly hierarchical way; even now, some authors stress the importance of teams having a "strong leader" (Nolte and Tremblay, 2005, p. 8). Most recent literature reacts against this tradition, instead promoting the ideas of power sharing and distributed leadership (D'Amour et al., 2005, pp.118-119; Drinka & Clarke, 2000, p. 12, 18; Martin & Rogers, 2004, p. 171).

Furthermore, a number of authors assert that power should not only be shared, but shared on an equal basis among different health professionals on a team. For example, Hall (2005) asserts that "[t]he milieu for collaborative practice must foster a status-equal basis between the various team members" (p. 192). And Ray (1998) observes that one of the key assumptions that underlie the thinking of the proponents of interdisciplinary health practice is that "each discipline has an equal voice in…decisions" (p. 1371). Indeed, a curious feature of much of literature is that it only seems to contemplate two extreme possibilities: The traditional "hierarchical power structure, with the physician in control" (Hall, 2005, p 192), or power-sharing on the basis of total equality.

In the last chapter, however, a number of facilitators indicated that although power was shared in the effective teams they work on, it was not necessarily shared equally; as one admitted, there was "no such thing" as perfect equality. The distribution of power could not be precisely determined in advance and varied depending on the particular health problem faced, the relative degree of education and training of team members in relation to that problem, their administrative and legal responsibilities, and how much experience they had working together. What seemed most important, in their opinion, was that each team member have an opportunity to contribute and influence the team's actions.

There is some support for these views in the literature. Drinka and Clarke (2000) write that power is not shared equally, but that each team member must have the power to contribute to decision making (pp. 17, 145). Both "leaders" and "followers" on teams must "feel a sense of power and understand their ability to contribute to the team's development and maintenance" (Drinka & Clarke, 2000, p. 111). D'Amour et al. (2005) found that teams shared power, but the exact distribution depended on members' knowledge, experience and relationships—but not, interestingly, so much on formal titles (p. 119). Mackay et al. (1995) draw a link between the greater degree of power physicians generally enjoy in teams and the fact that they typically have the final responsibility for patients (including legal liability); any discussions of redistribution of power, then, must also take into account the distribution of responsibilities (p. 8).

In their study with interdisciplinary health teams, Chatalalsingh and Regehr (2006) found that the transparency and negotiability of power relations was more important to many staff members than perfect equality.

> A pretence of "equality" is much less appreciated than explicit clarity which recognizes power differences and allows these to be made discussable. What staff crave, and what seems to work, is a planful approach to decision-making, where it is collaboratively decided how the decisions will be made…with related clarity about responsibility and accountability for the decision. (p. 141)

'Communities of practice' authority Wenger and co-authors McDermott and Snyder (2002) seem to have arrived at a similar conclusion in relation to the groups they work with:

> We used to think that we should encourage all community members to participate equally. But because people have different levels of interest in the community, this expectation is unrealistic.… A large

> portion of community members are peripheral and rarely participate. Instead, they keep to the sidelines, watching the interaction of the core and active members. Some remain peripheral because they feel that their observations are not appropriate for the whole or carry no authority. Others do not have the time to contribute more actively. In a traditional meeting or team we would discourage such half-hearted involvement, but these peripheral activities are an essential dimension of communities of practice. Indeed, the people on the sidelines often are not as passive as they seem. Like people sitting at a cafe watching the activity on the street, they gain their own insights from the discussions and put them to good use. They may have private conversations about the issues being discussed in the public forum. In their own way, they are learning a lot. (p. 4)

Although the interdisciplinary healthcare literature and the facilitators' comments do not go to the same extreme as Wenger et al. (2002), agreement can be found on the idea that perfect equality may not always be the 'ideal standard' for teamwork.

Power, Influence and Relation

A third insight that that emerged under the heading of decentralized interactions and organization concerned the difference one facilitator proposed between power and influence.

> In power I *control* what happens and [in] influence I *affect* what happens. And if I'm willing to think in terms of effect, then I know that there will be other effects. And then I can be open, so I don't have to give up my input and my influence on what's going to happen with the client, by allowing others to have an influence as well. But if I think in terms of power and sharing power…there's only so much power and we've got to figure out who has what. And with the word influence, opens it up much more broadly than the word power…. If someone is in a position where they're attempting to exercise power, then others could either fight back or acquiesce. But if they're thinking in terms of influence, they might find it easier to bring what they have together.

Power thus implies a scarcity, potential conflict, and a need to divide things up among individuals. On the other hand, *influence* emphasizes connections and shifts the focus from compartmentalized individuals to collective action. This facilitator also linked the latter approach to trust (letting go of control requires trust of others) and non-mechanistic, complexivist ways of thinking.

In a similar vein, other facilitators noted that successful student teams were those that were able to give up individual power, or control, and work together as a unit; that opening oneself up to others can be both psychologically difficult and liberating; and that this sort of 'connected' teamwork required a more mature sense of professional autonomy which balanced individual specialization with team responsibilities.

As briefly mentioned in an earlier section, healthcare thinker Suchman (2006) has articulated similar ideas around the contrasting values of *control* and *relation*. A mature clinical approach, he writes, respects the benefits of control-oriented reductionist science. However, it also recognizes the severe limitations of this approach when applied to complex human contexts like interprofessional and caregiver-patient relationships.

> At the level of thinking and action, the control paradigm encourages an appealing yet utterly unrealistic fantasy of personal control, focusing on the individual as the primary locus of agency. It interferes with the perception of systems and the recognition of emergent phenomena – synergistic processes which are effectively and spontaneously orchestrated through complex interactions among individuals. (Suchman, 2006, p. 5)

In such situations, the relation paradigm is more appropriate, he claims, since it emphasizes interconnection and receptivity.

> In the relation paradigm, the most valued state to which one aspires is one of connection and belonging. In this state, one has a feeling of being part of a larger whole – a team, a learning group, a dance troupe, a community, even the world itself. One's individual actions seem spontaneously integrated with those of others to a remarkable degree, contributing to the evolution of a higher order process, i.e. one at a higher system level than that of the individuals of which it is comprised. (Suchman, 2006, p. 6)

In any case, the contrast that the facilitators and Suchman make between 1) ideas about teamwork based on influence and relation that connect people, and 2) those based on power and control that divide people, are worth pursuing in future research.

There are, however, dangers in pursuing this line of thinking in an uncritical fashion. In the first place, the distinction between power and influence may not be so clear-cut; the influence wielded by powerful lobbyists on governments, for example, might be seen as a form of hidden power. Furthermore, shifting the focus from the distribution of power among people to the nature of their relationships may lead researchers to gloss over unjust distributions of power, such as those based on gender, ethnicity or social-economic status. These dangers must also be carefully attended to in future research.

A recent study by Houchin and Maclean (2005) illustrates the danger of applying complexity, at least as articulated in popular management literature, without attending to issues of power and related theories and principles from psychology and social theory. In a four-year ethnographic study of a public-sector organization, they found that employing complexivist concepts (specifically, sensitivity to initial conditions, negative and positive feedback processes, disequilibrium and emergent order) actually aggravated power differences.

> Over the period of the research, AYTAG [the public-sector organization] left in place hierarchical structures that it had inherited, and acted to increase hierarchy in areas where it initially had a flat structure. What emerged was a traditional hierarchical organization. (p. 159)

Listening and Being Open to Others

A fourth insight that emerged in the last chapter was related to the above issues of influence and relation: Several facilitators emphasized the importance in teams of listening, of recognizing your limits, of not assuming that you understood others' perspectives, and of dialogue and being open to others—even if it means asking "dumb" questions. These ideas are generally not very well represented in the interdisciplinary health teams literature, although many interdisciplinary health authors do note the importance of respect between team members.

There is, however, some support for them in wider literature on group learning. For example, Senge (1990) warns of the danger of confusing one's mental models with reality and of not opening one's views to influence. Surowiecki (2004) points out that dissenting views can make groups' decisions more nuanced and rigorous, even when those views turn out to be "not-so-smart" or ill-conceived (pp. 30, 184). Karpiak (2000), writing in the context of transformational adult learning and explicitly invoking complexity and related "new paradigm" sciences, writes about the importance of *attunement*, including "mindfulness and attentiveness to our interactions with others", "maintenance of cognitive flexibility" and "an attitude of curiosity and openness to new information or novel events" (p. 35).

These ideas concerning the importance of listening and openness can also be linked to hermeneutic thought. Smith (1991) argues that authentic engagement, whether between individuals or cultures, requires being open to one's own prejudices, to true otherness, and to being changed by the other. Based on the work of Gadamer, Smith writes,

> Prejudice (prejudgement) is not a swear word but rather a sign that we can only make sense of the world from with a particular "horizon" which provides the starting point for out thoughts and actions. Understanding between persons is possible only to the degree that people can initiate a conversation between themselves and bring a "fusion" of their different horizons into a new understanding which they can hold in common.... How I will be transformed depends upon my orientation and attitude toward what comes to meet me as new; whether I simply try to subsume or repress it within prevailing dispensations (a possible prelude to war or hostilities) or whether I engage it creatively in an effort to create a new common, shared, reality. (1991, p. 193)

What is perhaps most interesting about these insights, from the perspective of interdisciplinary teamwork, is that such openness—to others and their ideas, to the limitations of one's own knowledge, and to being changed—benefits not only individuals but also the collective; according to both the facilitators and the above quoted literature, this sort of openness can make teams 'smarter'.

8.14 Openness, Constraints, Pedagogy and Nested Systems

Speaking of openness, though now in a slightly more specific and technical sense, the paired conditions that are probably most directly relevant to the education and pedagogy of teams are *openness and constraints*. As we have seen, these conditions are concerned with finding an appropriate balance between, on the one hand, rules or boundaries necessary to orient and sustain the coherence of a complex system and, on the other, sufficient openness for diversity to express itself and for the system as a whole to develop in innovative and unpredictable ways. Indeed, when these two conditions are properly balanced, they can be seen as mutually supportive; that is, constraints can be seen as *enabling*, for example, in that way the rules of grammar enable communication.

In the last chapter, we saw how these concepts helped facilitators articulate the value for teamwork of enabling constraints such as agenda setting and ensuring that team members gave one another regular feedback. Interdisciplinary health teams literature also offers support for this idea. Drinka and Clarke (2000), for instance, write that, for interdisciplinary teams to thrive, certain rules or structures must be established, including rules for promoting constructive conflict (p. 12, 159). Both Opie (1997) and McKee (2003) describe professions' disciplinary knowledge, or narratives, as both enabling certain possibilities for thinking and placing constraints upon that thinking (p. 17; p. 402). In the more general field of organizational learning, Senge (1990) has written of the importance of having, and enforcing, ground rules of dialogue (p. 249).

During the interviews, focus group and so on, several issues came up in relation to these conditions. Two in particular merit further exploration: 1) using potentially difficult theory with students; 2) using the idea of nested systems to develop a pedagogical tool.

Using Theory with Students

The first concerned the pedagogical issue of using potentially difficult theories explicitly with students, as well as how this might fit with the course's facilitation-oriented (rather than didactic or lecture-based) approach. Facilitators held divergent views on a number of topics:

- Whether theoretical frameworks such as the complexivist ideas should be introduced to students at all, or whether it would be best to just immerse students in the practice of interdisciplinary teamwork.
- Whether such theoretical ideas should be introduced to students in a structured way, or whether facilitators ought only to ask questions and deal with theoretical issues and assumptions *if and when* they emerge spontaneously in class.
- Whether the complexivist ideas should be introduced only at a very basic level, or whether students would be able to understand them at a more sophisticated level.
- Whether or not the complexivist theoretical frameworks should be introduced through background readings.
- Whether the complexivist ideas should be used to structure and/or tie together classroom activities.
- To what extent the ideas would need to be illustrated with practical, "concrete" examples for students to understand and apply them.

These dilemmas were particularly interesting to me, since they embodied a tension that is at the heart of any educational endeavour. It is a tension between, on the one hand, the desire to 'transmit' or 'share' specific knowledge to learners and, on the other, the prevailing educational view that learners actively construct their own understandings of present experience based on past experience, and in such a way as to maintain overall coherence[7]. (In the complexivist terms developed in this dissertation, the former approach can be seen as being concerned with 'constraints', while the latter can be seen being concerned with ensuring sufficient 'openness'.)

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[7] This latter, 'constructivist' view can be rephrased in complexivist terms as learners adapting to experience in a manner that is governed by their own self-organizing structure rather than external forces.

As discussed earlier, INTD 410's pedagogy is based on a 'facilitation' approach. The facilitators themselves are based in a particular health discipline and cannot be expected to be an 'expert' with respect to the full range of disciplinary knowledge relevant to a case scenario or present on any one team. They therefore concentrate more on guiding students and offering critically constructive feedback than on giving answers or transmitting any particular body of health-related knowledge.

However, interdisciplinary health teamwork and education might be considered a kind of 'discipline' in itself; a small body of literature on this and related topics exists and is growing rapidly. Course organizers and most facilitators thought that it was important to introduce such "nurturing" or "enabling" theoretical structures to students. These structures, they felt, would be particularly useful to students who were struggling in class, and to those who would be working in interdisciplinary health contexts and having to deal with disciplinary conflict.

In fact, the majority of facilitators favoured using complexivist theoretical ideas explicitly, in readings and to organize and tie together activities. However, most also felt that the ideas should only be introduced in very basic or general terms and illustrated with many concrete examples.

Furthermore, the different views facilitators held with regard to using the theories should not necessarily be seen as a 'problem to be solved' or something requiring a standardized or universal answer. The usefulness of explicit theoretical ideas would likely vary depending on the particular students, teams, classes and facilitators involved, as well as various contextual factors. As one facilitator—who as we saw in the last chapter applied the idea of nested systems to the course collective—put it,

> You've got individuals within teams, within sections, within a program. And so the program is giving something to each section. The section is giving something to each team. The team is giving something to each student. And at each level there is a variation.

On a more general level, there is no easy or universal 'answer' to the dilemma posed by the conditions of openness and constraints either. What constitutes 'enabling constraints, or appropriate tensions will vary depending on the situation, and will need to be negotiated (and renegotiated) by participants. What the complexivist ideas and this research offer in this context, then, is not so much an 'answer' as a productive way of articulating an important tension in education—and, perhaps most importantly, showing how this tension between openness and constraints need not be viewed in a 'zero-sum' way: The conditions can become mutually supportive.

Nested Systems as an Enabling Constraint for Teamwork

In the previous chapter, one facilitator took the complexivist idea of nested systems and used it to create a structure for her teams to use to approach their case scenarios. The following brief summary is taken directly from an email which was reproduced fully in the previous chapter.

> Basically, the idea was to have the students divide up their initial comments or contributions concerning a patient into several explicit categories, for example, physiology, environment, safety, family/social context, etc. (From a complexivist perspective, I might call these the different levels of complex systems relevant to a patient's health.).... It is important to note that this is a two-stage process. First, the students identified categories and put their ideas 'out there'. Then, second, they started to look for connections between ideas and strategies for making treatments complimentary.

As we saw, she and other facilitators believed it a very useful tool. In the first place, they thought it would help students to negotiate and integrate their differing disciplinary insights, both in the course and in their subsequent professional practice. Secondly, in a more political sense, there was a sense that it might promote greater equality by keeping certain individual or professional agendas from dominating interprofessional teams.

Finally, the tool enacted several important complexivist principles. On the one hand, it kept knowledge concerned with differing, incommensurable complex systems distinct; that is, knowledge concerned with one level of complexity as not *reduced* to, or conflated with, another. On the other hand, it prompted students to find ways to make productive, complementary links between treatment strategies at various levels. And once these different treatments start to adapt to, build on and reinforce one another, the possibility for unpredictable, 'more-than-the-sum-of-the-parts' solutions presents itself.

This pedagogical innovation led me to return to the literature on interdisciplinary and healthcare education, to search for similar or supporting ideas. There was some. Senge (1991), for example, had written of the importance both of advocating for one's views in teams and of holding those views "gently; that is, holding them, and the assumptions behind them, out for out for explicit examination and influence (p. 248). Beattie (1995) envisages future healthcare spanning across four different "practice paradigms" or models of health": The biotechnological, the biographical, the ecological, and the communitarian (p. 19). Each model

> can be seen as a manifestation of a different form of 'cultural bias' and…employs a distinct 'explanatory framework', each finds its justification in a different set of institutional values and social interests, and within each 'paradigm of practice' social relationships are structured in a distinctive way. (p. 20)[8]

However, he proposes these categories from the perspective of a cultural anthropologist, as way of understanding the "tribal" boundaries between health disciplines. He does not contemplate using them as a pedagogical or teamwork tool.

After the research with facilitators was complete, I came upon the work of Bell et al. (2002), associated with the University of Arizona's Program in Integrative Medicine. They have developed a very sophisticated model of the nested complex systems relevant to healthcare. Explicitly complexivist in orientation, they have created a diagram of the various levels (or "domains") for research in integrative-medicine that closely resembles the educational nested systems diagram (including its concentric circles) reproduced in Chapter 2 of this dissertation as well as the 'nested living systems related to healthcare' diagram I sketched for facilitators that is described in Chapter 7. These domains include "molecules" "cells", "organs", "person", "physical environment", "social environment" and the "transcendent" (p. 135).

> The person is the clinical focus, but the research examines the person as an intact, complex, dynamic system, composed of lower-order systems and existing within higher-order systems. Integrative research includes multiple variables in interaction and emphasizes that evolving context (higher-order systems and dynamics) in which the person as a system functions. This approach permits optimal

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[8] Like the authors influenced by socio-cultural theory discussed in the first action research cycle, Beattie's explanation of disciplinary differences is rooted exclusively in socio-cultural factors, and does not contemplate the possibility that they may also result from incommensurabilities among the differing complex systems that health professionals engage with.

> understanding of the person as a living system within larger systems. (p. 135)

However, Bell et al. (2002) have developed this model as an alternative approach to health outcomes research, rather than as a tool to be used by interdisciplinary teams in their practice and education. Nevertheless, their well-developed conception of the multiple, interacting levels of complex living systems involved in healthcare can certainly be seen as giving credibility to the facilitator's innovative pedagogical framework.

There is a potential weakness with the nested systems pedagogical tool, though, when read against the ideas about interdisciplinarity developed earlier in this dissertation. Earlier I argued that disciplinary differences have two main, intertwined sources:

> 1) The complexity of knowers, in this case, individuals and disciplinary collectives, which is well articulated by socio-cultural accounts concerned with gender, class, professional socialization, historical conflict, and so on. Beattie's (1995) "anthropological" approach to disciplinary differences, for example, falls into this category.
>
> 2) The complexity of the phenomenon 'known", that is, the systems with which knowers engage, which is well explained by thinkers associated with complexity science. Bell et al.'s (2002) model of integrative medicine takes this tack.

The nested systems framework addresses the latter but not the former. That is, it provides a way to integrate disciplinary knowledge that differs as a result of the differing sorts of complex systems studied. It does not explicitly deal with the issue of integrating disciplinary knowledge that differs as a result of socio-cultural factors. In practice, of course, these two sources of disciplinary difference are deeply and historically intertwined. But attending to both and keeping them analytically distinct provides, as I argued in Chapter 4, a much fuller understanding of disciplinary differences and interdisciplinary integration in healthcare.

Certainly, there are dangers in ignoring either sort of complexity in interdisciplinary healthcare:

- Focusing just on the complexity of phenomena (and not that of knowers) blinds one to the political and historical forces that motivate and shape healthcare practices and research ("whose interests does it serve" and so forth).
- Focusing just on the complexity of knowers (and not that of phenomena) tends to lead towards the view that everything is a human construction, and

> blinds one to the connected realities of the more-than-human world (for example, our dependence on ecosystems). In context of healthcare, disciplines are not *just* different "constructions" linked by socio-culturally explicated historical and political relations. They are linked in the "concrete" situation of the patient and the micro and macro systems in which the patient nests.

Indeed, such concrete, 'real world' connections are likely what motivate interdisciplinarity in the first place. As Schon & Rein (1994) describe, from an intellectual or academic point of view, it is difficult to imagine how disciplinary, or "frame", conflicts could ever be resolved; but in the "fruitful mire" of situated practice, people do find ways to get things done (p. 176). Newell (2007) asserts that interdisciplinarity in academia is essential for addressing the deeply (and non-linearly) interconnected problems of the 21st Century. In a health-related context, one of the facilitators observed that it was the challenging realities of patient problems in low-income neighbourhoods that pushed practitioners in her area to adopt—and indeed pioneer—interdisciplinary team-based care.

There is also an ethical dimension to this these considerations. Interdisciplinary health teams thinkers rooted in socio-cultural approaches understand the epistemological and ethical relationships between different kinds of professional knowledge solely in terms of disciplinary knowers. Beattie (1995), as we saw above, sees different practice paradigms as finding their justification in differing sets of social and institutional values, interests and relationships. Similarly, Drinka and Clarke (2000) assert that "all facts and theories are human constructs" and that practitioners ought to both "adhere to a particular school of thought or to stand up for a particular value"—what they call making a "commitment in relativism"—and to respect the different perspectives offered by other disciplines (p. 92).

Expanding the focus of ethical deliberations to include the nested complexity of the phenomenon 'known', studied, or engaged with takes us beyond such relativistic frameworks. Practitioners must consider the relationships between differing kinds of knowledge (as well as the assessments and treatment plans that enact this knowledge) not simply because they come into contact with other practitioners; they must do so because the phenomena or systems with which they are engaging are 'always already' connected. For example, events at the societal or cultural level (such as unemployment) have clear physiological effects on individuals. And actions taken in relation to the bodily level (such as the overuse of antibiotics or vitamin supplements) influence larger scale social and ecological systems. Such connections must be acknowledged and considered ethically.

8.2 The Participants: Through an Action Research Lens

The ideas discussed in the previous section do not, of course, exist in a vacuum. They were articulated, shared, contested and enacted by myself and the eight facilitators, in relation to particular academic, institutional and professional contexts. It is important, therefore, to reflect on the concrete particulars of this portion of the research, that is, on the roles played by myself and the facilitators, and the effects that our interaction had on us and our contexts.

Because of its focus on concrete situations and practices, action research and its principles provide an especially useful lens for reflecting on this aspect of the research. As described in the previous cycle, the distinctive features of action research include its collaborative orientation, a respect for the principles of democratic participation, reflexivity on the part of researchers, a foregrounding of ethical concerns, its aim of creating new knowledge, and a spiral process of reflection, planning, acting, observing, reflection, and so on. One further principle of action research, at least in its more participatory incarnations, concerns the empowerment of research participants. Participatory action research, Creswell (2002) writes, incorporates “an emancipatory aim of improving and empowering individuals and organizations in educational (and other) settings” (p. 609). As we shall see, each of these principles offers a useful entry point for critical examination.

Collaboration

Action research typically seeks to break down the traditional one-way relationship between researchers and researched, and to involve research “subjects” in planning, interpretation and knowledge construction relating to the research (Moore, 2004, p. 150). The relationships between myself and the facilitators did indeed seem like a very collaborative, two-way one. Both my knowledge of complexity and learning theories and their knowledge and experience of interdisciplinary health teamwork and education contributed to the research process and products. Several surprising insights and actions emerged from this interaction—for example, the importance of trust in teams—and the use of complexity's idea of nested systems as a teamwork tool.

There is, however, one way in which the current cycle may be said to vary somewhat from action research principles: The facilitators were not involved in the *original* development of the consolidated teamwork checklist or in selecting the complexivist readings to be used in the course. As described in the first action research cycle, these came out of my previous collaboration with the organizers. The facilitators adopted, challenged and elaborated on the complexivist ideas, but they did not originate or choose them.

This fact may not, in itself, be a major problem from the perspective of action research, however. As Valla (2002) writes, there is on-going discussion within the action research community about at what point the participants must begin their involvement in the research (p. 173). Furthermore, it is quite typical for action research projects to widen the circle of participants from one cycle to another.

Democratic Principles

An additional requirement related to action research's collaborative and democratic orientation is that research should involve the *active participation* of the 'subjects' involved in and affected by the research (Adelman, 1993, p. 9). Participants must feel that without their contribution, the knowledge could not have been produced (Valla 2002, p. 173).

Although the facilitators were not involved in developing the original complexivist ideas to be used in the course manual, they were certainly responsible for how these ideas were changed and elaborated in the current action research cycle. Indeed, the focus of this cycle was not so much the original complexivist ideas—they primarily served as a point of departure—as the ways in which the facilitators compared, contrasted and otherwise linked them to their interdisciplinary team practice and education.

In addition, facilitators were provided with an opportunity to provide input and criticism with respect to the results of the research. As discussed in the Introduction and the Planning chapter of this cycle, emergent interpretations were shared with them through emails. In order to solicit facilitators' input and critique, they were sent those portions of the dissertation in which they were involved. They were also encouraged to draw my attention to any event or interpretation that he or she felt had been misrepresented in any way whatsoever.

New Knowledge

New knowledge grounded in and applicable to participants' concrete situations and practices is one important goal of action research, and such knowledge did in fact emerge as a result of our interaction. New insights emerged concerning the role of trust in bridging disciplinary knowledge difference; balancing individual and team learning focuses; the relationships between equality, power and influence; the importance of listening, seeing one's own limits and being open to others; and the use of complexity's concept of nested systems as a tool for integrating team contributions. Most of these insights were simply not foreseeable based on the original complexivist ideas used in the student manual; they could not have emerged without the active participation of the facilitators.

As in the first action research cycle, however, a question arises from a complexivist perspective—namely whether or not the knowledge and insights generated truly had a collective dimension and were not simply an aggregate of individual knowledge and insights. In the current research cycle, this issue is quite complicated.

For example, the development of the nested systems framework had both individual and collective aspects. I contributed the basic idea based on my previous reading of complexivist and healthcare literature. All of the facilitators liked the idea and applied it to varying degrees to their thinking, practice and pedagogy. Only one, however, took the initiative to develop the idea into a framework for students to use in patient case scenarios. This new tool was then shared with me and, subsequently, the other facilitators through email and the focus group. The other facilitators voiced their general approval and offered critiques and elaborations of it. Finally, I formally described and interpreted the framework in this writing.

Collective processes were thus at play in generating this new knowledge. However, it is difficult to draw a clear and lasting line around any specific collective. At certain points in time only one or two people were responsible for moving the idea forward, while at others—say, during the focus group—a larger number was involved. Furthermore, as we shall see in the next action research cycle, the nested systems framework is taken up by a *different* collective—specifically, the organizers—with myself as the only continuing participant.

Given this messy mixture of individual and collective thinking, with groups coming together and then separating over time, can we say that a collective knower and collective knowledge truly emerged? There are several reasons to say yes. First, the fact that the collectives involved were relatively transient should not present an insurmountable problem. Many identifiable human collectives exist for only a short period of time, at least compared to other living systems such as organisms, cultures and ecosystems. Examples include juries, committees, sports teams and interdisciplinary health teams.

Second, it is not necessary that each and every participant fully understands, agrees with, or plays a major role in the development of collective knowledge. Recall that agents in complex systems need not be in accord with, or even understand, the emergent orientation or knowledge of the system as a whole (Cilliers, 1998, p. 5). And even peripheral individuals may play important roles in communities of practice (Wenger et al. 2002, p. 4).

Finally, although we were not often together in the same time and place, participants did build on one another's ideas in a way that exceeded 'the sum of the parts'. As described above, the facilitators and I elaborated on one another's ideas in a way that simply could not have been predicted ahead of time. The nested systems framework for evaluating case scenarios emerged unpredictably from interaction between myself and the facilitators. And once it emerged, this idea further shaped our thinking about teams—and our thinking in turn contributed back to the on-going evolution of the idea.

Complicity

Action research principles also require reflexivity on the part of researchers and a foregrounding of ethical concerns. As Sumara and Davis (1997) emphasize, "Whether we choose to acknowledge it or not, as researchers, we are never merely interruptions in the ongoing events of others' lives. We are always and already participating in the unfolding of lives" (p. 304). In the current research, one possible danger is that I, as the participant with the most control over the research process and findings, would have forced my theoretical ideas on the other participants. This was, in fact, one of the questions I asked the facilitators in the interview: "Did you feel that these ideas were imposed from above?"

Happily, every facilitator replied in the negative. There were probably several reasons for this answer. In the first place, their participation in the research was entirely voluntary and tailored to whatever time, thought and energy they were willing to contribute. Secondly, the work they did with me was merely an 'add on' to the existing course curriculum; they did not need to listen to or rely on me or my ideas in order to carry out their duties as facilitators. Finally, most facilitators had established positions at local health institutions and were not terribly concerned about the career implications of their performance in INTD 410 (though all, in my experience, wished to help students and 'do a good job').

Perhaps a more pertinent question is whether I truly opened myself and my thinking to the facilitators. As Smith (1991) puts it, authentic engagement, whether between individuals or cultures, requires being open to one's own prejudices, to true otherness, and to being changed by the other. This is not an easy question to address, obviously; if one is not truly open to others, one will likely not be aware of it. Throughout the interviews and focus groups, I have tried to foreground my background and thinking, and to be open to the other participants' perspectives. As mentioned above, I also gave them the opportunity to critique and otherwise contribute to the results of the research, including this dissertation. However, this issue will ultimately be judged by those who read this dissertation.

A related question is the degree of control I exercised—or should have exercised, or failed to exercise—over the progress of the research. It was difficult for me not to worry about how the facilitators made use of the complexivist ideas both in class and in later practice. Had they understood the ideas sufficiently? Would they be able to communicate them adequately in class with students? Would the ideas really help the facilitators and students, or would they simply add confusion to an already full course curriculum? These were a few of the fears that haunted me during the first few weeks of class.

Indeed, these fears became manifest in one class. I was helping out the course organizers by dropping off teaching materials in facilitators' classrooms. In one class, a facilitator I had worked with was trying to use the conditions of diversity and commonality to frame a discussion of a case with students. Although I was in the class for less than a minute, the students did not seem to be responding quickly or well to the facilitator's attempts to draw them in to conversation.

Although this was the tiniest sample of classroom events, I was greatly concerned and discussed this event with one of the course organizers and my PhD supervisor. Both made it clear to me that I should not try to control or take responsibility for everything facilitators did with the ideas. This seemed an appropriate position; respecting the autonomy of participants and recognizing the limits of one's control of, and responsibility for, the unfolding of events is compatible with the principles of both complexity science and action research.

Action researcher theorist Winter (2003) points out, based on both dialectical and Buddhist thought, individuals are never entirely responsible for the situations in which they find themselves. Still, since all phenomena are connected within dynamic networks and every action will have far ranging effects, "individuals must always take responsibility for trying to make those effects as beneficial as possible" (p. 148).

Seeking to balance this tension between, on the one hand, the autonomy of the facilitator and the limits of my own responsibility, and, on the other, the partial responsibility I bore in the unfolding of events, I wrote an email. As discussed earlier, based on several facilitators' suggestions, I had been sending them brief weekly emails on issues linking the course's current topics to the complexivist ideas we had discussed. Often these emails were based on insightful comments made by a facilitator during the previous week, which I wanted to share with the others.

The email did not identify the above classroom event or the facilitator involved. However, it did discuss the general relevance of the complexivist ideas for day-to-day facilitation work with students. (One other facilitator had asked me this question in the previous week and I thought it a good way to address my concerns about using the ideas in class.) Essentially I wrote that the more experienced organizers and facilitators believed that good facilitation was something that took skill, experience and reflection, that no one set of ideas (complexivist or otherwise) could ensure success. However, I also wrote

> [c]omplexity can provide explicit concepts to support the philosophy behind facilitation (thus far, we have mostly discussed its relevance for interdisciplinary teamwork). For instance, a complexivist would see classes and teams as self-organizing, decentralized complex systems that cannot be directly controlled or determined (unlike more linear, mechanical systems, which can be controlled). Effective education, therefore, is about providing suitable conditions for collective learning to emerge and mindfully adapting to unpredictable classroom dynamics…. Of course, you do not have to make these concepts explicit in you facilitation with students. Terms like 'emergence' and 'self-organization' might just confuse them. But these concepts will hopefully provide some useful tools for your own thinking and planning in relation to the course and your practice.

I hoped that through this email, I had taken responsible action in relation to my role as one participant within the unfolding events, while at the same time respecting the privacy and autonomy of the facilitators involved.

Empowerment

A crucial concern of many action researchers is empowerment or emancipation of research participants. As Kemmis & McTaggart (2000) write of the more participatory sorts of action research,

> Action research aims to set in motion processes by which participants collectively make critical analyses of the nature of their practices, their understandings, and the settings in which they practice in order to confront and overcome irrationality, injustice, alienation, and suffering *in these practice settings* and *in relation to the consequences of their practices in these settings* (p. 592; italics in original)

Although this study was not primarily concerned with such emancipatory goals, they do provide a useful focus for evaluating the effects of research described in this cycle.

Local Effects (The Classroom): How, then, did this stage of the research influence facilitators? In the classroom context, our development of the complexivist ideas seem to have empowered at least some of the facilitators. One, for example, commented that the ideas were a "wonderful addition". Another said that they made her feel "more credible" and "more confident" than in past years. Several others offered similar views about how the ideas helped them to articulate and reflect on teamwork-related issues they had witnessed in class and in their own practice, as well as on the pedagogical strategies they used.

One issue I was aware of throughout the research was the extra time and reading imposed on facilitators to take part in the research. During the course and in the final interviews and focus group, I broached this point several times with each facilitator. The consensus among them was that the ideas were interesting rather than an imposition, so long as they were not expected to explicitly cover the complexivist ideas with students in class. Given the other demands placed on them by the curriculum, this would have been too much for most of them. As one first year facilitator put it,

> I thought adding the ideas was helpful, because it did help me conceptualize. If I had felt like I must specifically communicate this,

> then it would have been a burden. Because then I would have felt overwhelmed with trying to pull that into a context that I didn't understand really well yet anyway. But it did help me with the framework and the background.

Although students were not participants in this research, its effect on them deserves consideration too. The ideas did not really seem to affect the relationships between facilitators and students a great deal, since the course was already based on a facilitative model rather than a lecture-based one. Furthermore, several of the facilitators observed that students did not generally make long-term use of any of the theoretical resources and teamwork checklists offered in the student manual.

Still, as we saw in the previous chapter, several facilitators did manage to work some of the ideas into classroom activities. One even made a structure based on the idea of nested systems a crucial part of how students approached case scenarios. Those student teams that adopted it, she said, performed much better in their end-of-term evaluations.

The development of complexivist ideas described in this cycle therefore seemed to have had a significant positive influence on facilitators' and students' practical thinking and tasks. It is more questionable, however, whether they could be said to empowered them in the sense of helping them to critically analyze their practices and social contexts, or to "confront and overcome irrationality, injustice, alienation, and suffering" (Kemmis & McTaggart, 2000, p. 592). The purpose of most *participatory* action research, as we have seen, is not simply to enable participants to adapt better to existing social structures; it has the aim of critiquing and transformating them.

There were, however, several developments during the second action research cycle that pointed towards more participatory and transformative possibilities, both at the level of the course and in terms of wider institutional matters. In the previous chapter, I described how a number of facilitators, both in the individual interviews and especially in the end-of-term focus group, emphasized the importance of meeting with other facilitators to discuss new ideas and concrete ways to incorporate them into classroom activities. This idea was intriguing, I wrote, because it enacted the very principles of team learning and knowledge-creation we were trying to communicate through the course.

This development can also be seen as empowering, since it involves the facilitators coming together to explore the limitations and possibilities of their thinking and practices. This method of learning accords well with Freire's 'dialogical method' in several ways. First, learning occurs through back and forth dialogue in which participants articulate and share their own knowledge and experiences, rather than through a linear, unidirectional flow of knowledge from teacher to student (Stevens, n.d., Dialogical Method). Second, the learning is not just oriented towards deepening understanding; it also builds community and social capital among the facilitators (Smith, 2005).

Wider Institutional Effects: The facilitators who participated in this research came from a variety of professional and institutional contexts. Several were tenured or untenured faculty members, though none came from the same department. More worked in nearby hospitals and other health institutions, though again no two came from the same institution. All were well-educated professionals with positions that they regarded as relatively secure and personally fulfilling.

Still, as the previous chapter showed, many of them felt that interdisciplinary health teams and teamwork were not always well-respected or well-supported in their institutional contexts—thus, for example, the perceived need for a 'strong theory' to justify interdisciplinary health education and practice generally and INTD 410 specifically. (This impression, as we have seen in the previous section other chapters, finds support in the interdisciplinary and healthcare literature.) A recurring theme was the division between the 'hard' and 'soft' sciences. As one facilitator put it,

> hardcore science types or academics…look at social theories and social frameworks and psychological frameworks and psychological theories as fluffy stuff not grounded in science not grounded in literature.

It is difficult to say what emancipatory effect of this research has been or will be on many facilitators' professional and institutional contexts. As we saw, most felt that the ideas resonated with and helped them to articulate and elaborate on their experience of interdisciplinary practice. One told me that she had passed on the complexivist readings to her manager, with a view towards justifying the importance of such teams and of learning teamwork skills. Another said that she used the ideas to frame her understanding of current reforms in her faculty. However, such wider effects are difficult to track and were not the focus of specific data gathering activities.

As we shall see in the next chapter, the ideas *did* have a significant effect on the work of at least one facilitator, and this work in turn may have a very wide effect on interdisciplinary health teams in the Province of Alberta. Since this effect took place after the end of the course and the planned data gathering activities, however, I discuss it in the third action research spiral.

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Cycle 3: Widening Circles

The first action research spiral involved myself and the INTD 410 course organizers, as we developed new ideas for the course curriculum based on the existing course structures, the organizers' expertise in interdisciplinary education, and my own knowledge of complexivist and related learning theories. The second action research spiral embraced additional participants: The eight facilitators from local healthcare institutions and the university's health faculties. Our collaboration focused on how the ideas developed in the first cycle related to, and interacted with, facilitators' ideas and experiences of interdisciplinary practice and pedagogy.

The third cycle widens the circle of participation further, including many participants not connected in any formal manner with INTD 410. It also differs from the previous cycles in several significant ways.

First, it is on-going. Action research is not typically characterized by clear beginnings and endings. But the first two cycles could be said to have achieved some sense of 'closure' in terms of action, for example, in the first cycle when the new course manual was finished, or in the second cycle when the final focus group had been held. The events to be described in the third cycle, however, are very much unfinished. In the final chapter, I nonetheless reflect on everything that has happened so far as a result of (or at least in connection with) this dissertation research.

Second, much of what is happening was not 'planned' in any formal sense. The first two cycles certainly involved improvised plans, unpredictable events and emergent interpretations. However, a general structure had been worked out by myself and organizers near the beginning: That I would work first with the course organizers (to develop new ideas and curriculum) and then with the facilitators (to critique and elaborate on those ideas and curriculum), all the while keeping detailed notes on meetings, emails and other interactions, as well as sound recordings of final interviews and a focus group.

The third cycle is much less structured. I play a less central role in many of the events that occur. Indeed, the third cycle deals primarily with how *others* take up (or do not take up) the ideas developed in the first two cycles. Further, several groups with no direct connection to INTD 410 are involved. Finally, the data gathering methods are less formal, consisting mostly of my observations, notes, email exchanges, and any feedback participants chose to offer after reading a draft of this dissertation.

9.0 Chapter 9: Planning

When I first started discussing this research project with the course organizers, there was a shared understanding that its results might be used to shape future INTD 410 course curriculum and pedagogy. Of course, the ideas we developed for the course manual had not been developed yet and neither had we 'piloted' the ideas in more depth with a limited group of facilitators. As a consequence, the nature of possible future changes to the curriculum and pedagogy remained quite vague until after the first and second research cycles were completed.

At a meeting with the course coordinator several months after the end of the course, I provided a brief synopsis of some of the results of the research so far, concentrating on insights that emerged related to the course curriculum. One was the perceived need for a strong theoretical framework to both justify and guide interdisciplinary teamwork in the course. In particular, I noted the need for an explicit teamwork checklist or model that facilitators and students could use consistently throughout the course.

Second, I said that the theoretical framework chosen need not be complexity, but that it should account for the two forms of disciplinary differences described in the first cycle: The complexity of knowers (in this case, human beings and disciplinary collectives) and the complexity of the phenomenon 'known" (that is, the systems with which these knowers engage). Common socio-cultural models of interdisciplinary integration, I argued, articulated the former well but not the latter.

Finally, I described how one facilitator had taken the complexivist idea of nested systems and used it to create a structure for her teams to use to approach their case scenarios. This innovation, which had resonated well with the other facilitators, was something that I thought they might consider including in the course manual in future years.

Based on these observations, the course coordinator and I decided that I would initiate the development of two resources for possible use in the course in the following year—subject, of course, to the feedback and approval of the other organizers. The first was a single teamwork checklist that combined the previous, complexity-inspired checklist with the other, existing resources. We envisioned something with four to 10 'basic' conditions that students could use for reference and reflection in each case scenario. The second was a clinical evaluation structure based on the tool developed by the aforementioned facilitator using the concept of nested systems. From my perspective, the latter resource (the nested systems clinical evaluation structure) helped to address the 'complexity of the phenomena known', while the former resource (the teamwork checklist) would address the 'complexity of knowers'.

In any case, these resources would be presented for discussion to the other organizers at the next annual meeting—exactly one year after the annual meeting described in the first action research cycle. As we shall see in the Action and Observation chapter that follows, these ideas were acted upon to varying degrees, but they also had to negotiated with various organizers' views and the final 'product' was very much a function of collective thinking and compromise.

Another 'plan' that emerged after the end of INTD 410 was initiated by one of the participating facilitators. She worked as a project manager for a large local health authority and had been charged with developing tools and resources to enhance interdisciplinary teamwork in primary health care networks across the province of Alberta.

The complexity-inspired conditions in the consolidated teamwork checklist—and especially the way in which they had been arranged as complementary pairs to be kept in productive tension—had resonated strongly both with her philosophy and experience of teamwork and with stakeholder consultations she had helped to conduct with healthcare workers. She therefore asked me if she could make use of the conditions and combine them with other resources she was putting together. I said that would be fine, so long as she attributed the ideas to the various authors who contributed to them. In addition, I would have an opportunity to review, critique, edit and add to her treatment of the conditions and other aspects of the resources she was developing As we shall see in the next chapter, she used the ideas quite knowledgably and creatively.

The third major development, or 'plan', to arise as a result of the first two action research cycles involved several local healthcare organizations. Unbeknownst to me, a physician acquaintance of mine who was familiar with the collaborative research I was pursuing mentioned it to a professional colleague of his. The Director of Research Initiatives in Nursing and Health for a large region in Alberta, she and her group of researchers were studying a variety of issues related to health systems redesign and workforce planning, including interprofessional practice. This individual was also on the steering committee of the provincial nursing association, and knew that the association was about to begin research on the similarities and differences in the education and knowledge base of the three registered nursing professions in Alberta: Registered Nurses, Licensed Practical Nurses and Registered Psychiatric Nurses. Apparently, she discussed the research with the others on the steering committee.

Part way through my data analysis, therefore, I received an unexpected phone call from a third party—the Director of Policy and Practice at the provincial nurses association—asking about the precise nature of my research and whether or not I or anyone I knew might be interested in acting as an "expert consultant". We agreed that I would send her a summary of my research and that she would send me information on their project and the position they were looking to fill. After reading the research summary, she also invited me to present my research to the association's steering committee.

Several days after that, I received an email from the first person—the Director of Research Initiatives in Nursing and Health for the large region—inviting me to meet with her team of researchers. (She had also had a chance to review the research summary I sent.) She explained that one of their areas of focus was "interprofessional, collaborative practice" and that their "largest interprofessional project [was] being evaluated using complexity theory as a theoretical framework". They were therefore interested in meeting to learn about my research, "with a view to exploring potential opportunities for collaboration at some point".

Thus began further collaborations with a widening circle of healthcare professionals and policy makers—the details of which are described in the next chapter.

10.0 Chapter 10: Action and Observation

This chapter deals with the still unfolding collaborative activities that came about as a result of the research activities described in the first two action research cycles. The specific 'plans'—that is, the various events and intentions—that precipitated these collaborative activities are described in the previous chapter. In this chapter, I discuss the activities in reverse order, starting with my interaction with the two healthcare organizations.

10.1 Health Care Organizations

Relatively little has yet come about in relation to these organizations, though there is a possibility for much greater collaboration in the future. As planned in the last chapter, I did in fact present my research to the steering committee for the provincial nursing association. They showed interest in the research and conceptual frames used, and indicated that it had some relevance for their current and future research activities.

The research they were undertaking involved, as described above, understanding and setting out in a systematic fashion the similarities and differences in the education and knowledge base of the three registered nursing professions. We discussed this research in detail, as well as the various consultants they were bringing in and the roles they still wished to fill on their research team.

Because of potential political tensions between members of the various nursing professions—registered nurses, licensed practical nurses and registered psychiatric nurses—they wanted to hire at least some people from a 'neutral', non-nursing background. They were particularly interested in researchers with a background in education, since the project dealt with knowledge, learning and post-secondary nursing curriculum.

I was quite busy with my PhD dissertation at the time, so I said that any involvement I might have would need to be many months in the future. In the meantime, I made inquiries within the Education Faculty at the University of Alberta, in order to find researchers with the sort of expertise they required. Based on suggestions from faculty and my own reading of faculty and researcher profiles, I wound up suggesting several possible candidates they might wish to contact.

In any case, I told the Director of Policy and Practice of the provincial nurses association that I remained very interested in their research and would like to attend future meetings concerned with that research. Since then I have attended several meetings and it has been made clear to me that a consultant position on the research team would likely be available for me when my studies were complete, if I wished it.

Another strong possibility for future collaboration arose out of the presentation for the research team concerned with interprofessional, collaborative practice at the large health region. Again, the presentation was well-attended and well-received. As described above, they had recently decided to use complexity theory as an evaluative theoretical framework. Several commented that the presentation gave them a chance to step back and see the issues they were working on “in the big picture”.

Quite unexpectedly, the Director of this organization also raised the issue of future collaboration, this time in the form of a post-doctoral position. They would be learning about a grant to support such a position the following year, right around when I planned to complete my PhD. I was informed that if they received the funding they expected to, I should consider taking this position. Because of the wide range of pressing healthcare-related issues their research group was dealing with (including interdisciplinary teams), this position sounded particularly attractive to me.

Finally, I was encouraged by the aforementioned people to present my research at a large healthcare conference in Alberta specifically dedicated to interprofessional collaboration in healthcare. The conference was sponsored by the various provincial professional associations—medicine, nursing, pharmacy, and so on—and I was told that I could bill the Nurses Association for my attendance, based on the hours I had dedicated to their research program so far. I submitted an abstract for a poster presentation (the primary presentation format at this conference) to the organizers and was accepted.

10.2 Resources for Primary Healthcare Networks

The collaborative activities just described relate mostly to future possibilities rather than concrete actions. The facilitator mentioned above, however—the one developing tools and resources to enhance interdisciplinary teamwork in primary healthcare networks—has already taken several actions in collaboration with me and several other healthcare professionals.

More specifically, she has taken each of the paired conditions articulated in the consolidated checklist; adapted them to the specific focus of primary care teams; added a number of concrete illustrations from actual health practice and quotes from her stakeholder consolations; created visualizations to help communicate the ideas (for example, a diagram of scales to illustrate the need to balance conditions); and developed a list of questions for discussion and a checklist for personal reflection. Furthermore, she has linked each pair of conditions to a dramatic movie clip, to create what she called "think pieces" for primary healthcare practitioners.

She sent me copies of the written portions of these resources to review and edit, and I made several changes. In addition, she invited me and several experienced health professionals to view the video clips and resources, and discuss them over dinner. We all gave our feedback and shared ideas.

Recently, I learned that the various resources she developed had been incorporated into a binder for use by primary health care networks across the province (Alberta Health and Wellness, 2006). In addition, this binder had just been showcased in a presentation at a large provincial healthcare conference on interprofessional collaboration.

10.3 Curriculum Changes

The changes most expected to result from the research conducted in the first two cycles were to the curriculum of INTD 410, and a number of significant changes did in fact occur. However, the curricular innovations that resulted from the research had to go through several further rounds of negotiation with various organizers' views and the final 'product' was very much a function of collective thinking and compromise. (As we shall see, this need not be seen as a unfavourable result, since it actually enacted the ideas about collective learning described in this dissertation.)

At the annual meeting of INTD 410 organizers, I presented the brief synopsis described above in the Planning chapter, plus the two resources I had started developing since meeting earlier with the course coordinator: 1) A new consolidated teamwork checklist based on six conditions: Diversity, Commonality, Ground Rules, Shared Responsibility, Idea Interaction and Coordinated Collective Action; and 2) A nested systems clinical evaluation structure provisionally called the "Process for IntD

Case Evaluation". The latter resource involved several steps in which student teams were asked to distinguish first assessment and then treatment issues in relation to bodily systems, whole person, social environment and so on. Among other things, it also encouraged them to reflect on possible conflicts and complementarities between these levels, on ways to integrate their diverse contributions, and on their personal assumptions and reactions to patients' lifestyle choices and other relevant issues. (This resource was ultimately incorporated into two of the course's case scenario evaluations, which can be seen in **Appendix D** on p. 170.)

The organizers seemed receptive to these ideas, but several felt they still needed significant work to be made clearer to students and directly applicable to INTD 410. The intention in presenting the resources was, of course, to open discussion on such resources, rather than present them as a *fait accompli*. And so they were encouraged to change, edit or otherwise comment on the resources and forward this feedback to me, so that it could be incorporated. Several organizers did in fact provide such concrete feedback in the next few days and I incorporated all of their insightful suggestions.

Several weeks later, however, one particularly experienced and engaged organizer met with the course coordinator and me to discuss further changes. She had developed her own teamwork checklist, or tool, based both on the new consolidated teamwork checklist I had developed and on some of the teamwork resources from which the existing course checklists had originally been developed. Interestingly, she also wished to link the ideas more directly and explicitly to complexity science.

We agreed to work together to come up with a combined teamwork checklist. At first, we worked largely in parallel, seeking to incorporate insights from one another's work into our own general frameworks. Ultimately, however, I deferred to her expertise and our combined effort used her "Team Synergy Model", and its compelling circular visual motif, as its general framework.

The resulting model drew heavily on complexity and the two complexity-inspired teamwork checklists I had developed. It began with a several paragraph introduction to complexity science and explicitly referenced the importance of balancing diversity and commonality, as well as openness and constraint. It also stressed the importance of trust and how teams should "share ideas and information in order to question assumptions, to explore areas of both agreement and conflict, and to build on each other's insights".

There were significant differences as well, however. The model consisted of four key components: Purpose, Roles, Processes and Interactions. As the preamble to the model stated, "Integrating these components of a team will produce creative synergies among team members, producing new ideas and solutions and resulting in a highly functional team." Furthermore, the model embraced concepts from different sources, like "Continuous Quality Improvement" and balancing "task" and "process" focuses.

When we next presented our work to the other organizers, however, a change of personnel had occurred. One new organizer had joined the group and taken on responsibility for many of the administrative and instruction aspects.

The new organizer had an extensive background in psychology and felt that the "Team Synergy Model" focused too exclusively on the team-level. Students also needed to know the *individual* competencies they should strive towards in the course. In addition, she thought that it would be useful to add some insights from the "Emotional Intelligence" literature and she provided the organizers and me with a variety of readings on such approaches at both the individual and (especially) the group levels. Her input garnered significant support from the other organizers and so another revision of the "Team Synergy Model" (the name was retained) was undertaken.

The resulting product was divided into three sections: Individual Competencies, Team Competencies and Team Processes. Much of the new model built on ideas from the existing model. For example, the importance of balancing diversity and commonality was articulated in several areas ("Effective teams strive for a balance between the benefits of diversity and those of commonality"). There were references to the importance of trust and building on one another's ideas, and the level of the collective or team was treated as having its own integrity, not reducible to the sum of its members. A published article in which I had discussed complexivist conditions for teamwork was listed in the references.

The model's attitude towards consensus was more ambiguous. One the one hand, the model asserts that

> [A]chieving consensus on all issues…may not be possible given the diversity of opinions of team members. Instead, teams should strive to

> achieve common ground regarding key issues, priorities, and team direction.

On the other hand, it also claims that "achieving consensus…would be ideal" and that a cohesive team "strives to achieve consensus in decision-making".

Of course, there were major conceptual differences as well. In the first place, an explicit distinction was made between individual competencies, team competencies, and team processes. Second, a distinction was made between emotions, attitudes/cognitive factors, and behaviours (at both the individual and team-levels). The aspect of emotion—in particular the importance of individuals and teams being aware of and regulating their emotional states—truly added something new to the teamwork model. (The final "Team Synergy Model" is attached in **Appendix E**, p. 175.)

Significant developments occurred with respect to the other resource as well—the nested systems clinical evaluation structure titled "Process for IntD Case Evaluation". As discussed above, the organizers had critiqued the structure and I had incorporated all of their insightful suggestions. However, they still felt that the process was too generic and ought best to be adapted to particular case scenarios and student activities.

This work was in fact carried out, though not by me due to both conflicting research commitments and the organizers' superior understanding of the clinical aspects of the particular case scenarios and activities. The step-by-step process was used to structure two of the courses most crucial team-based case scenarios—"Mr. Mysenko" and "Kelly R. (Again, both these resources are attached in **Appendix D** on p. 170.)

Before the start of the next session of INTD 410, therefore, the ideas introduced in the first action research cycle—and then critiqued, elaborated on, and changed in the second—had evolved and been amalgamated with other ideas in several areas of the course curriculum. Two significant developments in particular were poised to change the curriculum: 1) the much revised "Team Synergy Model", and 2) the nested systems clinical evaluation process used to structure the two case scenarios.

11.0 Chapter 11: Reflection

11.1 Negotiations and Unpredictable Connections

As we have seen, the complexivist ideas that the organizers, facilitators and I collectively developed brought considerable change to the course curriculum and influenced the thinking of the participants. They also have significant implications for the wider literature on the education of interdisciplinary health teams.

From my perspective, however, several developments could be seen as disappointments. One was that some of the more radical concepts—for example, that teams can be seen as emergent collective learners in their own right, or that coherent team plans can arise from diversity rather consensus—were de-emphasized in the newest curricular materials.

Part of the reason may have had to do with practical considerations and time constraints. While the curriculum changes described in the last chapter were occurring, I was writing my dissertation and therefore unable to put as much time and thought as I would have liked into the resources I was developing. This may have accounted for organizers' observation that the resources needed significant change to be made clearer to students and directly applicable to INTD 410. As we have seen, similar time constraint issues operated in first and second cycle: In the first, with regard to curriculum changes; in second, with regard to the lack of time and opportunities facilitators had to integrate the ideas into classroom pedagogy.

The passage of time may also have affected the organizers' willingness to adopt the more radical of the complexivist ideas. Although they seemed initially open to non-traditional conceptions of learning and teamwork, such conceptions can be difficult to maintain over time if the prevailing cultural norms favour more 'common sense' notions of individual learning and consensus.

As discussed in the last chapter, they did support the relatively novel idea of including emotional intelligence insights in the "Team Synergy Model". At the same time, though, this model perpetuated some traditional assumptions about the distinction between cognition and emotion, a distinction closely tied to the hard/soft sciences divide articulated by a facilitator in the last cycle: "hardcore science types or academics…look at social theories and social frameworks and psychological frameworks and psychological theories as fluffy stuff".

A large part of the reason for the more radical complexivist ideas not making more inroads with the organizers, however, may lie with me. In the Reflection chapter of the last cycle, I noted that authentic engagement requires one to be open to one's own prejudices, to true otherness, and to being changed by the other. In retrospect, I wonder whether I had truly opened myself to the organizers' input. The "consolidated" teamwork checklists I worked on in both the first and third cycles may have relied too heavily on the complexivist ideas I was developing and not enough on the organizers' more traditional ideas.

This might explain why the first version was simply added to existing checklists, and why the next was thought to need extensive changes in order to be suitable for use in the course. Had I initially tried to more explicitly include organizers' ideas—for example concerning some of the individualistic and emotional aspects of learning—even though I may have disagreed with some of them—then perhaps in the longer term, a greater degree of mutual change in thinking might have come about. (It cannot, of course, be presumed that such change in thinking would necessarily be towards the ideas I advocated.)

The above considerations are particularly important from a complexivist perspective, since—as discussed in previous sections—they offer evidence as to whether or not a complex collective knower and collective knowledge truly emerged around these ideas. One might argue, for instance, that if a collective really had emerged around the ideas, and people had taken 'ownership' of them, then it would not have been possible for the new organizer to alter people's ideas so significantly.

I think it is wrong, however, to view the issue in such 'black and white' terms. That the new organizer influenced the other organizers does not necessarily mean that a collective had not emerged around at least some of the ideas—for example, the value of diversity and enabling constraints, the concept of nested systems, and a concern for group level learning. Furthermore, complex social collectives, as discussed earlier, change and evolve relatively quickly. The next academic year may see the arrival of several additional organizers and further noticeable shifts in thinking.

Another development that could potentially be seen as a disappointment from my perspective was that the final "Teamwork Synergy Model" represented a compromise, leaving out several ideas that I thought were important and including several that I thought were not. However, such compromise with the ideas and experiences of the other organizers need not be seen as a bad thing. Indeed, the process that led to its creation can be seen as enacting the very processes of group learning articulated by the complexivist ideas.

The *diverse* knowledge of participants—in the areas of health education, psychology, complexity and so on—were articulated during the process. We built *commonalities* by reading one another's resources and recommended readings. Organization and power was *decentralized* among the group, even though some participants might arguably have had greater say than others. Our *ideas interacted* during the various stages of development, as we critiqued and elaborated on one another's work. And the need to produce a relatively brief summary of the important conditions for teamwork that could be and used by students imposed an *enabling constraint* (though the fact that *all* organizers had to approve of the ideas in the model may arguably have imposed too much of a constraint on creativity). Finally, the 'product' that emerged was truly a collective product, one that exceeded the knowledge of all the participating individuals.

Furthermore, this process added a number of valuable insights that were not present in the new consolidated checklist that I developed. For instance, the need to balance individual and team-level focuses was something that the "Teamwork Synergy Model" articulated quite well. A facilitator had emphasized this balance to me in the second research cycle, but the new consolidated checklist had not directly addressed it.

In any case, one of the most important lessons learned from this research is that change cannot easily be predicted or controlled. The nature of the changes that came about through the present research could not have been predicted in advance. This is because the ideas were adapted to specific course contexts; negotiated and combined with organizers', facilitators' and my own evolving knowledge and experience; and finally taken up in unforeseeable ways by people outside of the course collective. Furthermore, the collectives that participated in this process—the organizers, facilitators and outside groups—formed, evolved, dispersed and influenced one another in a variety of complex and unpredictably ways.

Indeed, arguably the greatest effects of the research occurred through unpredictable connections and in unexpected areas. As described in the last chapter, for example, the ideas developed were being used in the development of tools and resources to enhance interdisciplinary teamwork in primary health care networks across the province. They also favourably impressed the steering committee of the provincial nursing association and the research team of a large provincial health authority. And this impression may lead further collaboration on a much larger scale than INTD 410.

It seems therefore that ideas spread in a 'weed-like' or rhizomic manner, rather than (to extend the organic metaphor) as deliberately planted rows of vegetables. As a researcher and agent of change, therefore, it is important not to assume that one can control or even fully understand the events in which one participates. For both practical and ethical reasons, it is better to adapt to the opportunities that present themselves and work with others in an open and collaborative manner.

11.2 Contributions

In this final section, I examine the contributions this research makes to thinking and practice in INTD 410 specifically and the topic of interdisciplinary health teams education generally. I begin by discussing the influences on individual participants, specifically, the organizers, facilitators and myself. Then I consider the effects of the researchers on the course collective. Third, I briefly summarize how the research has begun to influence wider academic and professional communities. Finally, I turn to the realm of ideas, looking at how the knowledge created through this collaborative research may contribute to literature related to interdisciplinary health team education and practice.

Individual Participants

There was a mutual exchange of ideas and experiences among the organizers, facilitators and myself. I obviously learned a great deal about interdisciplinarity, health teams and the INTD 410's specific curriculum. Furthermore, this learning greatly affected the direction of my research and my own thinking about interdisciplinarity, teamwork and healthcare. As we shall see in the final section, this interaction is continuing to shape my thinking on these topics; during the writing of this section, I developed a model for understanding interdisciplinary healthcare, one that considers both the complexity of knowers and of the phenomena known.

Through the conditions to support the emergence of intelligent teams as well as certain background complexivist ideas such as 'nestedness', the organizers and facilitators were introduced to a variety of new perspectives on learning. As we saw, these ideas were supported, challenged, and elaborated on by these participants. Although the more radical aspects of these ideas—for instance, that of teams as collective learners—were not accepted by all, significant changes occurred in their thinking and pedagogical practices.

Many facilitators, for example, used the concepts of diversity, commonality and enabling constraints to better articulate their views on interdisciplinary teamwork practice and pedagogy. The complexivist ideas also led a number of facilitators to deeply explore the concepts of consensus, trust, power, influence and openness, as well as crucial educational dilemmas such as the tension between didactic instruction and learner-centred knowledge construction. Several facilitators made very innovative use of the ideas, developing new tools to use in their pedagogy and professional practice. For example, one created the nested systems clinical evaluation tool, and another adapted the complexivist conditions in order to develop resources to enhance interdisciplinary teamwork in primary health care networks across the province.

It is important to note, however, that the organizers, facilitators and I did not achieve any sort of consensus concerning these issues, at least not in the sense of 'thinking alike' of being 'of one mind'. We obviously shared *some* commonalities and our thinking evolved significantly through our mutual interaction. However, we also maintained our different specializations: I would certainly not claim to be able to practice on an actual interdisciplinary health team, and none of them, I think, would claim to be experts in education and learning theory. Through our interaction, though, we were able to generate collective insights that exceeded the 'sum of the parts' and that contributed back—albeit in different ways—to our individual thinking and practices.

Course Collective

The research also made a significant contribution to the course curriculum and, to a lesser extent, the relationships among participants. The relationships among the facilitators and organizers (including myself) were already characterized by relative equality and openness to other people and dissenting views. However, through the introduction of the complexivist ideas, concepts such as 'diversity' and 'commonality' entered the lexicon and were used by organizers and facilitators to articulate and elaborate on their views of group relations. For example, dissenting opinions came to be seen not just as something that should be accommodated, but also as a collective asset—a 'valuable diversity' that could make the group more intelligent.

Changes in the curriculum were more obvious. As discussed in the previous chapter, several major developments occurred, namely the development of 1) a single Team Synergy Model to replace the plethora of checklists employed previously, and 2) the nested systems clinical evaluation process used to structure two crucial case scenarios.

As discussed earlier, these developments were not 'straight-forward' consequences that could have been predicted at the beginning of the research. Instead, they emerged in unpredictable ways through interaction and negotiation between the participants. Furthermore, they represent significant innovations, since the Team Synergy Model and the nested systems evaluation structure are largely original works with no clear precedents in the interdisciplinary health teams literature.

Academic and Professional Communities

I described above how the research, unexpectedly, drew the attention of the provincial nursing association and the research unit of a large provincial health authority. Both these organizations have held out the possibility of future collaboration, and I will be presenting in 2007 at a conference they have helped to organize for health researchers and practitioners across the province. In addition, key aspects of the research—the conditions to support the emergence of intelligent teams—are being used in the development of tools and resources to enhance interdisciplinary teamwork in primary health care networks (Alberta Health and Wellness, 2006).

It is also my hope that the research will empower the organizers and facilitators in their relationships with wider institutional contexts. In Chapters 7 and 8, I described the perceived need for a 'strong' theory of interdisciplinary teamwork, not just to organize the course curriculum, but also to justify the importance of this topic to those with power in professional, governmental and university institutions. Several organizers and facilitators indicated to me that the ideas could be used in this manner. But, as mentioned previously, such wider effects are difficult to track and were not the focus of specific data gathering activities.

Wider Literature / Ideas

From an academic perspective, probably the greatest contributions of this research are the ideas and critiques that emerged in relation to the existing interdisciplinary health teams literature.

In the first action research cycle, I described how complexity can be used to

- Support existing socio-cultural analyses of disciplinary differences within interdisciplinary health teams by articulating an understanding of disciplines as complex, self-organizing learning systems with incommensurable ways of thinking and acting;
- Elaborate significantly on those analyses by a) offering an explicit account of how teams can become 'more than the sum of their parts' and b) locating another, overlooked source of disciplinary difference, namely, the incommensurability of the differing phenomena studied or engaged with; and
- Challenge existing assumptions about the possibility and desirability of achieving 'consensus' in interdisciplinary health teams.

The second action research cycle also offered a variety of valuable insights, including

- A confirmation of the general theoretical and pedagogical relevance of complexity science for interdisciplinary health teams;
- A deeper understanding of the meaning and significance of the conditions of diversity, commonality, decentralized organization, openness and constraint in this particular context;
- Further problematizations of the notion of consensus;
- Explanations and illustrations of the importance of trust and openness among health workers;
- An exploration of the controversial topic of equality and the tension between power and influence; and
- A new pedagogical structure for enabling interdisciplinary teamwork based on the concept of nested systems.

Furthermore, while writing this final reflection section and reviewing the reflections from previous cycles, I realized that another potential intellectual contribution had taken form over the course of writing the dissertation. Building on, or bringing together, the existing socio-cultural literature on interdisciplinary differences and complexivists insights about deeply interconnected yet incommensurable complex systems, I had argued in several places that in order to understand interdisciplinary health team's knowledge, one must consider *both* the complexity of knowers (including individual professionals and their respective disciplines) *and* the complexity of the phenomena studied or engaged with (bodily systems and sub-systems, the patient as a whole person, social environments and ecosystems).

I have also argued that these epistemological considerations have important ethical dimensions. Practitioners must respect and consider different kinds of disciplinary knowledge not simply because they come into contact with other practitioners; they must do so because the phenomena or systems with which they are engaging—bodily systems, whole persons, social contexts and ecosystems—are 'always already' connected.

When first beginning to write this section, I began to feel that this idea—originally developed at the end of the second action research cycle—ought to be more fully developed and formally represented. In order to begin developing this idea further, I have very recently put together a proposal to present at the Fall 2007 Conference of the Association for Integrative Studies. A brief abstract summary of this proposal is provided below:

> This presentation will articulate a theoretical model for understanding interdisciplinary integration in the context of health teams. This model draws on two strands of thought. One understands disciplinarity and interdisciplinary integration in terms of the complexity of the phenomena studied. The other strand explains them primarily in terms of the socio-cultural complexity of the 'knowers' doing the studying. The presenter believes that a robust understanding of interdisciplinary health teams must embrace both types of complexity.

Similar proposals have already been accepted for the 2007 conferences of the Canadian Society for the Study of Higher Education (CSSHE) and the Society for Teaching and Learning in Higher Education (STLHE).

In addition, I have created an elementary visual representation of this idea (see **Appendix F**, p 179). It essentially puts side-by-side 1) a version of Davis, Sumara & Luce-Kapler's (2000, p. 73) depiction of the nested complex systems relevant to education and 2) the very similar diagram I developed concerning the nested living systems related to healthcare. (As we saw in Chapter 8, a very similar diagram has been developed by researchers associated with the University of Arizona's Program in Integrative Medicine as an alternative approach to health outcomes research.) The former represents the complexity of the knowers, while the latter depicts the complexity of the known, that is, the phenomena these knowers study or engage with.

While knowers and the phenomena ‘known’ are not separable in any ultimate way, making a distinction between the two—as I have argued throughout the dissertation—is crucial for understanding interdisciplinary health teams. Furthermore, this distinction has not been articulated in the current literature on interdisciplinary health teams. Neither has it (to my knowledge) been made in more general literature on interdisciplinary research and education.

This last idea concerning the importance of considering the complexity of both knowers and the phenomena known is, therefore, one further contribution that I believe this research can make. Indeed, I believe I am well-suited to pursuing this theme in future research. As an educator studying theories concerned with various levels of learners (individuals, small social collectives, cultures and so on) I am well-prepared to examine the complexity of human knowers. And as someone with a background in complexivist thought, I can competently address the complexity of the phenomena known, or engaged with, as well. Finally, I believe that my extensive personal experience of different professions or occupations has prepared me well for the task of negotiating—without reducing or conflating—different professional paradigms. One cannot, of course, predict with any precision what the future will hold, but the study of interdisciplinary team learning is something I very much look forward to pursuing.

Conclusion: Learning into the Future

In this concluding chapter, I reflect on the lessons that have emerged during the research, and what may be carried forward into future collaborative activities. (Indeed, when writing this concluding section, I was tempted to call it 'Cycle 4?', since the reflections contained herein may well serve as a starting point for further collaboration around the ideas of complexity, interdisciplinarity and education.)

This research took a number of new ideas based in complexity science and related theories of learning—including the conditions for the emergence of intelligent collectives (Davis & Sumara, 2006) and concepts such emergence, nestedness and educators' ethical complicity—and explored their relevance in the specific context of interdisciplinary health team education. In addition to confirming the relevance of the new ideas and filling out their meaning in this particular context, the research articulated several new insights that challenged mainstream thinking on the topic of interdisciplinary health teams.

One such insight concerned the prevailing notion that interdisciplinary team members ought to learn one another's 'conceptual maps' and operate on the basis of consensus. This thesis takes a very different position. It argues that this latter approach negates the value of diversity or specialization and that the *overall* understanding of team activities should be sought not in individual minds but rather in the coordinated actions of the team itself as an emergent collective learner. In other words, an effective team can know more than the individuals that compose it.

Another insight concerned the role of trust. While trust is mentioned in some of the literature on teamwork, it is usually equated with interpersonal harmony or 'getting along'. This dissertation suggests a different role for trust, as the confidence team members have that each person will appropriately represent his or her *differing* domain of expertise and follow through on his or her commitments (as one facilitator put it, "doing the job that you say you will do"). As I wrote in Chapter 8, trust is something that helps "individual team members to let go of control and their claim to understand everything, and to acknowledge their interdependence and cooperate towards the accomplishment of larger goals."

The use of the concept of nested systems as a clinical evaluation and education tool constitutes a significant innovation as well. Although based on complexivist concepts originating in areas other than healthcare, it has proven to be an excellent framework for interdisciplinary health teamwork and education, providing a way for professionals to coordinate and build on one another's ideas without reducing or conflating different kinds of health-related knowledge.

Finally, the research articulates and provides support for the complexivist insight that those who wish to understand and practice interdisciplinarity must take into consideration *both* the complexity of the knowers *and* the complexity of the known (see, for example, Davis & Sumara, 2006, esp. chap. 8). This insight brings together two strands of thought in the interdisciplinary literature: Established socio-cultural accounts that concentrate on disciplinary knowers and more recent complexity-inspired accounts that focus on the systems those disciplinary knowers engage with.

Perhaps the most important thing about the ideas that emerged during this research, however, is that they clearly enjoyed legitimacy, or 'traction', within relevant communities and helped to bring about significant change to individual and systemic practices. In four areas in particular, the research seems to have acquired some momentum.

The first is the complexivist conditions for the emergence of intelligent teams, which, as we have seen, have had a major influence on INTD 410's curriculum through the Team Synergy Model. They have also been incorporated by one of the facilitators and her colleagues, with very few alterations, into a government-produced binder for use by primary healthcare networks across the Province of Alberta (Alberta Health and Wellness, 2006).

The second is the concept of the nested systems relevant to healthcare (subsystems, bodily systems, whole persons, social environment & ecosystem). It started as a background idea I discussed with organizers and facilitators. The fact that it was unexpectedly adopted by a facilitator—and then by the organizers as a framework for structuring INTD 410's most important case scenarios—shows its usefulness and legitimacy from their perspective.

In addition, both the research unit of the large health authority and the nursing association have expressed interest in future collaboration around the topic of interdisciplinary health teams.

Finally, as discussed in the previous chapter, I will be presenting on the topic of the 'doubly-complex' nature of interprofessional activities at a variety of interdisciplinary educational and health-related conferences in the coming months.

Based on my own knowledge of the literature and the receptivity of researchers I have spoken with so far, I believe that this insight concerning the connected but differing complexities of knowers and known may also enjoy significant 'traction' within interdisciplinary circles.

It is of course difficult to foresee precisely how and where these ideas will develop in the future. As the above examples illustrate, many of them have taken on a life of their own at the University of Alberta and in a variety of other institutions across the Province of Alberta. Furthermore, I plan to pursue similar collaborative research activities in an assistant professor position I recently accepted at the University of Ottawa. Colleagues in Alberta have already given me the names of researchers involved in interdisciplinary healthcare in that region.

It is my hope that future collaboration in which I am involved will give rise to similar insights and processes of mutual change. Such developments will no doubt be difficult to predict or control, as I and others adapt to the possibilities that present themselves through interaction. Perhaps the most valuable nugget of wisdom to be gained from the current research is that unexpected developments, diverse knowledge and dissenting opinions should not be seen as disruptive to teams and other collectives, but rather as a opportunities to learn. If people can maintain trust and relationship through change and conflict, then they can become collectively smarter.

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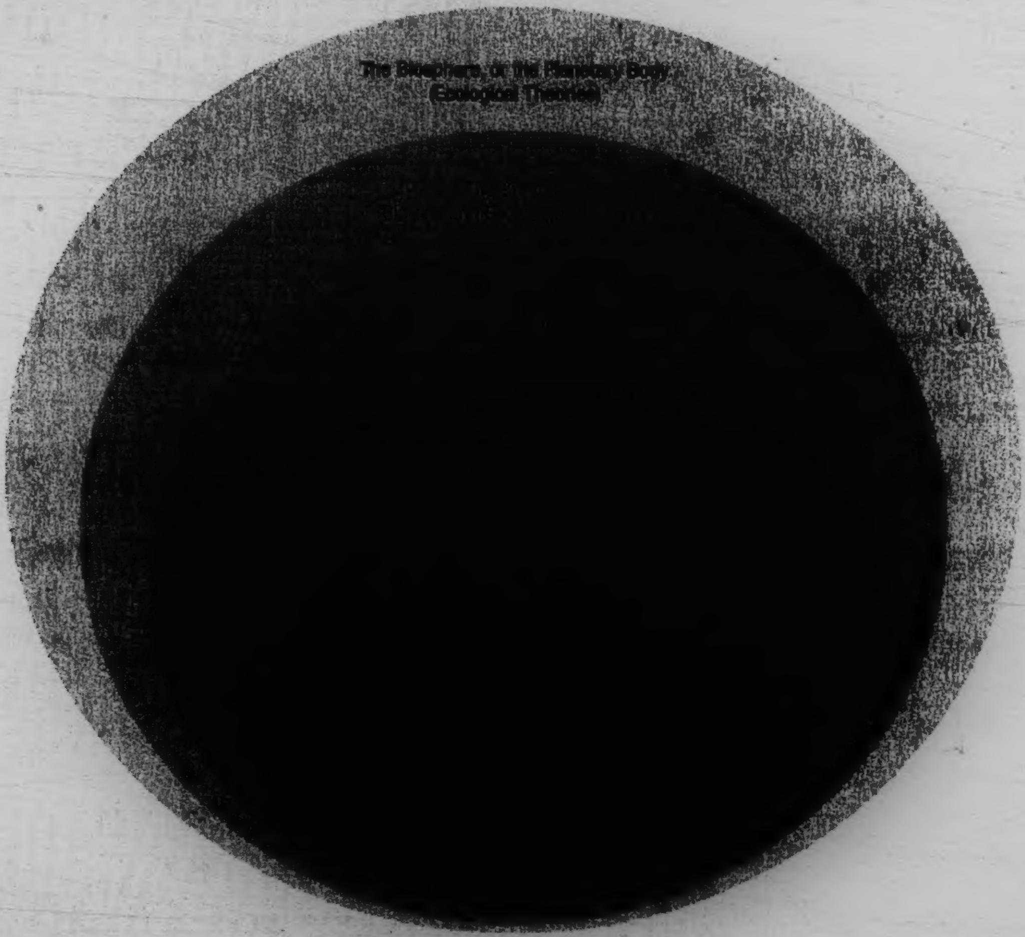
Appendix A: Some Nested Complex Learning Systems Relevant to Education


The Biosphere, or the Planetary Body
(Ecological Theories)

(Source: Davis, Sumara & Luce-Kapler, 2000, p. 73.)

Appendix B: Consolidated Teamwork Checklist

What Makes 'Smart' Teams?

Interdisciplinary health teams have been established to deal with complex, multifaceted health problems, such as diabetes, depression and addiction, which require the collaborative input of multiple disciplines. However, as Ray (1998) writes, "[t]he requirements for effective teamwork are not generally understood" (p. 1372).

In recent years, a number of authors influenced by complexity science and related discourses have identified conditions that support the emergence of effective, 'smart' teams and other collectives—conditions that enable a team to be more than just 'the sum of its parts'. The following framework for understanding some of the most important conditions is based on the work of Davis & Sumara (in press) and filled out with insights from Surowiecki (2004), Watts (2003), and interdisciplinary health care experts Ray (1998) and Drinka & Clark (2000). The conditions are arranged in pairs, because they can be understood in terms of achieving a balance.

1) Diversity ~ Commonality
2) Openness ~ Constraints
3) Decentralized Interactions ~ Organization

1) Diversity ~ Commonality

Teams must be able to adapt intelligently to complex problems and changing circumstances. Diversity or specialization is crucial in this context because it "expands a group's set of possible solutions and allows the group to conceptualize problems in novel ways" (Surowiecki, 2004, p. 36). Since they bring together people from a variety of professions, interdisciplinary health care teams offer a great deal of potential intellectual diversity.

For this diversity to be expressed, however, team members must both stand up for the knowledge offered by their particular discipline *and* recognize its limits; as Drinka & Clark (2000) write, all knowledge is inherently limited and partial (p. 86). Team members should also respect the complimentary contributions that can be made by other disciplines with differing knowledge and value orientations. For instance, a patient suffering from serious depression may require both the biomedical and pharmacological knowledge of a physician or pharmacist, and the whole-person and psychosocial insights of a nurse or social worker.

The complement to diversity is commonality or redundancy, the common ground that enables team members to interact and thereby make use of the diverse perspectives offered. Although it often goes unnoticed, there is substantial overlap in the core subject areas of different health disciplines (Drinka & Clark, 2000, p. 70). Furthermore, commonalities can be cultivated through shared experiences and team goals, values and visions (Ray, 1998, 1374). Team members should try to avoid the use of technical jargon in order to make the knowledge offered by their disciplines more accessible to others (Drinka & Clark, 2000, p. 98).

Commonality or redundancy in knowledge also makes teams more robust. It allows members to be flexible in the roles they play and compensate for one another's lapses. In this way, they can better withstand the loss of team members and assimilate new ones (Ray, 1998, 0. 1373). The conditions of diversity and commonality, in effect, prompt team members to strike a balance between their varied professional roles and their shared team responsibilities. For a team to function effectively, team members must contribute in both capacities (Student Manual, IntD 410, p. 40).

Checklist:

Diversity

- Commit to and express the knowledge offered by your own profession
- Recognize how your discipline shapes your thinking as well as its limits
- Understand and appreciate the different, complementary contributions of other professions

Commonality

- Commit to and express team goals and values, including patient/client centred care.
- Use non-technical language to communicate with others
- Recognize similarities in knowledge and skills between professions
- Show flexibility in team roles

2) Openness ~ Constraints

The second pair of conditions are concerned with finding an appropriate balance between, on the one hand, rules or constraints that are necessary to orient and sustain the coherence of team activities and, on the other, sufficient openness for diversity to express itself and for the team to solve problems in innovative and unpredictable ways. In a game of soccer, for instance, there are strict rules governing boundaries, hand use, fouls and so on—but opportunities for tremendous creativity and diverse possibilities are presented as well.

Achieving the right balance between constraints and openness can be tricky. In the context of interdisciplinary health teams, it often means balancing a 'process focus' with a 'task focus' (Student Manual, IntD 410, p. 16). Process concerns include setting team norms or ground rules, ensuring that everyone has an opportunity to speak, and having a means for making collective decisions. Task-oriented people are more concerned with advocating their own perspectives and solving problems at hand in a timely manner (Student Manual, IntD 410, p. 17). A 'smart' team balances these two approaches, establishing processes that guarantee timely and well-thought-out decisions, but do not in any way prejudge or predetermine what those decisions might be.

Checklist:

Openness

- Have processes in place to ensure that everyone gets a change to speak and contribute
- Make sure that decisions are not predetermined, or controlled by one or more assertive individuals
- Respect freedom to dissent when making decision or establishing rule

Constraints

- Have processes in place to focus the team on the problem at hand and make a collective decision in a timely manner
- Establish team norms, goals and values
- Once made, respect team rules and decisions, and work to achieve them.

3) Decentralized Interactions ~ Organization

Highly centralized forms of organization, such as those with dominant leaders who control information flow, rarely produce innovation; by contrast, decentralized forms of organization, which allow individuals and ideas to interact more freely, are quite effective at adapting to changing circumstances and solving complex problems (Watts, 2003, esp. chap. 9). As Drinka & Clark (2000) conclude in the context of interdisciplinary health care teams, "[t]he paradox and central assumption in this IHCT model is that the team (and not individual members) controls the power for its internal decision making" (p. 18).

Allowing decentralized interactions at the level of individuals need not entail disorganization at the level of the team as a whole. Processes can be developed for coordinating the efforts of different disciplines and collective team decisions must still be made (Ray, 1998, p. 1372). But responsibility for establishing (and when necessary, revising) these processes should be shared among the members of the team, as should participation in decision-making (Drinka & Clark, 2000, p. 17; Ray, 1998, p. 1371).

In the context of knowledge-oriented collectives like interdisciplinary teams, what is important is so much not that people physically interact; rather, the key is that their differing professional ways of thinking interact (Davis & Sumara, in press; Drinka & Clark, 2000, p. 65, 88). When diverse ideas and expertises are allowed to 'bump up' against, or build upon, one another, everyone's understanding is enriched and the team's horizon of possible solutions is widened. The team has truly become 'more than the sum of its parts'.

Checklist:

Decentralized Interactions

- Enable the interaction of differing ideas and expertise; share information
- Distribute the responsibility for decision making and team maintenance amongst all team members
- Give and be open to others' ideas and feedback

Organization

- Have a process for coordinating the interaction of ideas towards a team decision
- Coordinate team performances (care, treatment, etc.)
- Acknowledge and, where possible, resolve conflicts
- Allow team's organization structure to evolve with changing circumstances

Appendix C: Some Nested Complex Living Systems Relevant to Healthcare

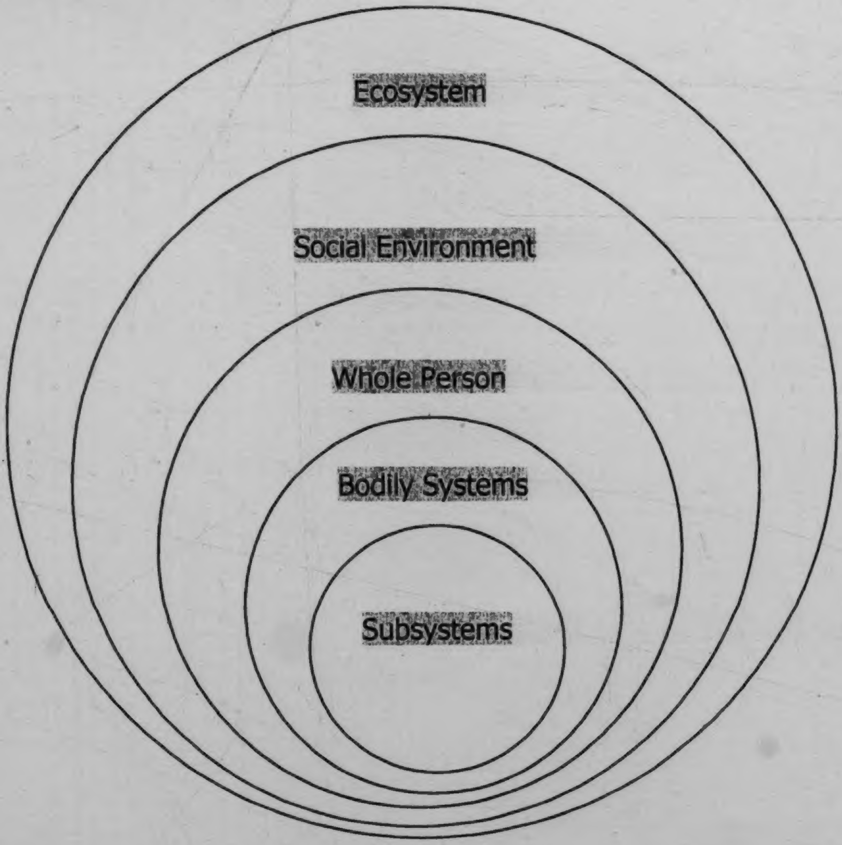
Ecosystem:
Built & Natural Environment, Workplace
Some Relevant Subject Areas:
Population Health, Ecology, Toxicology, Ergonomics

Social Environment:
Family, Community, Work, Culture
Some Relevant Subject Areas:
Social Sciences (Sociology, Politics & Economics), Marriage & Family Counselling

Whole Person:
Individual Biology, Body, Behaviour & Beliefs
Some Relevant Subject Areas:
Education, Counselling, Nutrition, Recreation

Bodily Systems:
Cardiovascular, Central Nervous, Musculo-Skeletal
Some Relevant Subject Areas:
Anatomy, Physiology, Oral Health, Pharmacological Sciences, Therapeutics

Subsystems:
Organs, Cells, Molecules
Some Relevant Subject Areas:
Biochemistry, Cell Biology, Pathology, Molecular Biology



Appendix D: Team Case Scenarios Using the Nested Systems Framework

(See Kelly R. and Mr. Mysenko Scenario Evaluation Forms below.)

Section #: ____________________ Team Name: ________________________

Kelly R. Scenario Evaluation Form

Use these forms to guide your discussion during your case scenario, and then hand in your completed form to your facilitator at the end of class.

Throughout each round of scenarios, identify Kelly's issues relevant to her health status at each level.

Subsystems (e.g., organs, cells, molecules)	**Bodily Systems** (e.g., cardiovascular, central nervous, musculo-skeletal)	**Whole Person** (e.g., body, individual biology, behaviour & beliefs)	**Social Environment** (e.g., family, community, culture)	**Physical Environment** (e.g., built and natural environment, workplace)
Issues: **Contributing factors:**	**Issues:** **Contributing factors:**	**Issues:** **Contributing factors:**	**Issues:** **Contributing factors:**	**Issues:** **Contributing factors:**

END OF ROUND 1

Reflect on any personal reactions or biases you may have with respect to Kelly (for example, regarding lifestyle choices).

END OF ROUND 2

Summarize your team's discussion of questions after Round 2. What were the general feelings of your team at the end of the discussion? Did perceptions change?

Are there any disciplinary or clinical roles that might help Kelly, but are missing in your team? What are those roles and what makes them necessary?

END OF ROUND 3

Summarize your team's care plan for Kelly.

Describe how your team came to consensus on this care plan. Did all members agree? Did the advocate play a key role?

Section #: _______________Team Name & Number: ___________________

Mr. Mysenko Scenario Evaluation Form

Use these forms to guide your discussion during your case scenario, and then hand in your completed form to your facilitator at the end of class. Point form is acceptable.

Steps 1-3: ASSESSMENT, BRAINSTORMING and PRE-CONFERENCE PLANNING

Step 1: Identify issues, contributing factors and additional information at each level relevant to Mr. Mysenko's health status. Be sure to take into consideration what you know of Mr. Mysenko's specific personal, behavioural, social and physical contexts, as well as how you might work *with* him to accomplish these plans.

Subsystems (e.g., organs, cells, molecules)	**Bodily Systems** (e.g., cardiovascular, central nervous, musculo-skeletal)	**Whole Person** (e.g., body, individual biology, behaviour & beliefs)	**Social Environment** (e.g., family, community, culture)	**Physical Environment** (e.g., built and natural environment, workplace)
Issues: **Contributing factors:** **Additional info:**	**Issues:** **Contributing factors:** **Additional info:**	**Issues:** **Contributing factors:** **Additional info:**	**Issues:** **Contributing factors:** **Additional info:**	**Issues:** **Contributing factors:** **Additional info:**

Step 2: a) Reflect on any personal reactions or biases you may have with respect to this patient (for example, regarding lifestyle choices). b) Imagine what Mr. Mysenko and the family members are feeling and decide as a team what your feelings might be in each role.

Step 3: How will you handle the conference? How will your team decide the overall direction? How will Mr. Mysenko and his family's views be heard in the discussion? How will your team ensure you have worked together as a team and not sequentially?

STEPS 4-8: TREATMENT PLAN (CURRENT AND FUTURE)

Step 4: Collectively negotiate specific action/treatment plans to pursue as well as which health discipline(s)/team member(s) will be responsible for carrying them out. Set out these plans below, including how the various treatments/actions may be coordinated.

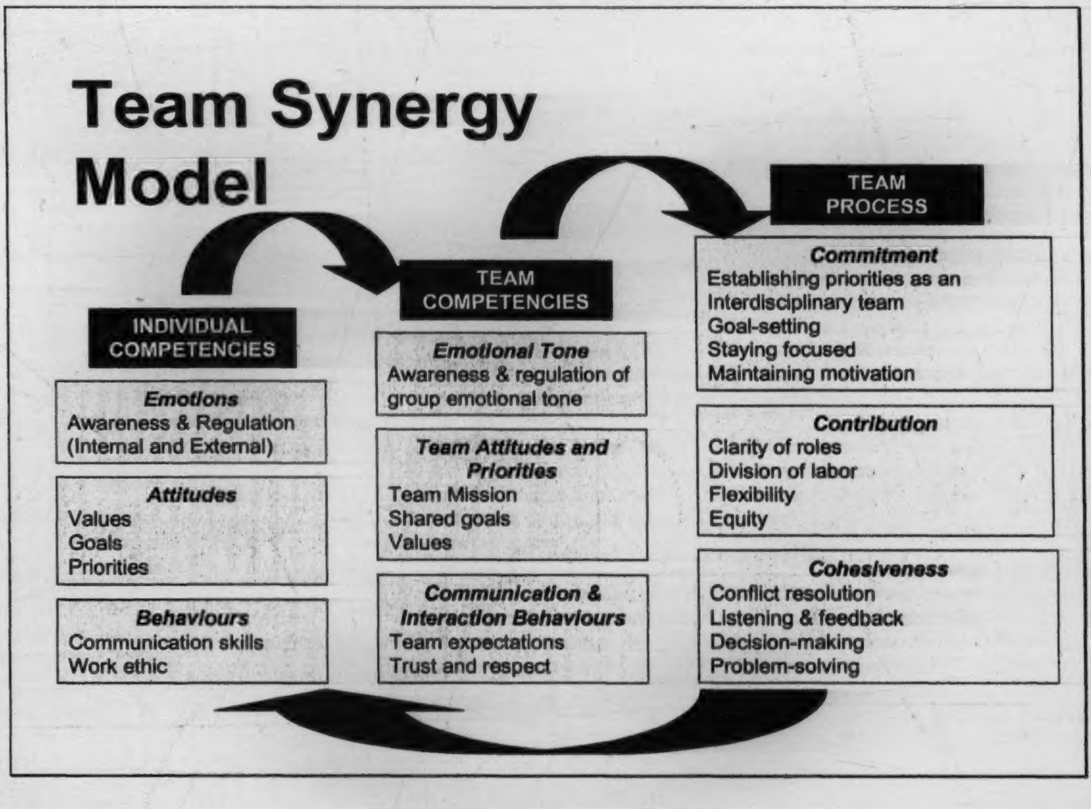
Step 5: Identify possible conflicts and/or complementarities in these action/treatment plans. Also, identify ways in which action/treatment plans at different levels might be coordinated.

Step 6: After your interaction with Mr. Mysenko and his family, identify additional personal, behavioural, social or contextual factors in the patient's life that may affect plans for treatment/action. What implications do these factors have for communication between you and Mr. Mysenko?

Step 7: Are there any disciplinary or clinical roles that might help Mr. Mysenko but are missing in your team? What are those roles and what makes them necessary?

Step 8: Discuss how you might need to change your action/treatment plans with Mr. Mysenko in the future (e.g. due to a negative reaction to medication, or Mr.Mysenko's failure to change certain behaviours, etc.)

Appendix E: Team Synergy Model


Team Synergy Model
INDIVIDUAL COMPETENCIES
Emotions
Awareness & Regulation
(Internal and External)
Attitudes
Values
Goals
Priorities
Behaviours
Communication skills
Work ethic
TEAM COMPETENCIES
Emotional Tone
Awareness & regulation of group emotional tone
Team Attitudes and Priorities
Team Mission
Shared goals
Values
Communication & Interaction Behaviours
Team expectations
Trust and respect
TEAM PROCESS
Commitment
Establishing priorities as an Interdisciplinary team
Goal-setting
Staying focused
Maintaining motivation
Contribution
Clarity of roles
Division of labor
Flexibility
Equity
Cohesiveness
Conflict resolution
Listening & feedback
Decision-making
Problem-solving

TEAM SYNERGY MODEL

Purpose

A Team Synergy Model was developed to assist in creating, supporting, and evaluating interdisciplinary team functioning. This model will support team learning and development, and aid teams in forming a creative, dynamic, and effective approach to patient care.

Members of successful interdisciplinary teams often have difficulty identifying the precise reasons why they "gel" and work together effectively. In order to assess team performance, one must take into account factors operating at both the individual and team level. These factors include: the personalities and knowledge bases of individual team members, the interactions among individuals on the team, knowledge sharing and idea generation within the team, the diversity and commonality of values and attitudes within the team, and the specific processes and structures employed by the team in completing their work.

Overview of the Model

The Synergy Model consists of three main sections: individual competencies, team competencies, and team process. The term **competency** is used here to represent the skill sets and capabilities that are present within individuals and also within teams of individuals. The assumption here is that these skill sets are not static, and that individuals and teams can continually reassess their own performance and functioning, and work toward continuous improvement both at the individual and team level. The third section of the model consists of the specific team norms, structures, and processes that are put in place to support optimum team performance. As with the competencies, team process can be continually evaluated and refined to improve performance.

Individual Competencies

In attempting to measure and understand human behaviour, social scientists typically focus on three main components of human functioning: affect, cognition, and behaviour. **Affect** refers to all things emotional, while **cognition** refers to the mental process of knowing, including processes involving awarenenss, reasoning, attitudes, and judgment. Both affect and cognition are largely internal, in that we often have to rely on people's reports about what they think and feel. The Team Synergy Model focuses on those thoughts and feelings that are directly relevant to performance within a team context. The behavioural component refers to those actions relevant to team functioning, such as work motivation, communication style, and interpersonal skills. Behavioral competencies differ from emotional and cognitive factors in that they are externally observable. Thus, competency assessment of affective and cognitive components will depend on personal reflection and self-report, whereas behavioural assessment may rely on evaluation by external observers as well.

Emotions

Individual emotional competence is based loosely on the concept of emotional intelligence, which refers to one's skills in understanding and managing emotions both internally and externally. Internal awareness refers to an understanding of one's own emotions, while external awareness refers to the ability to read and understand the emotions of others. Management of emotions refers to one's ability to effectively regulate one's own emotional state (internal management), and also to help others manage their emotions (external management).

Attitudes

Individual team members each bring their own set of values, priorities and goals to the table. A fully functioning team needs to value and respect the diverse points of view its members bring to the table. Similarly, the individuals within the team must be aware of how their personal views, biases, and opinions influence the functioning of their team.

Behaviours

Each member of the team brings his or her own interpersonal style into the team environment. These interpersonal behaviors include factors such as communication skills, work habits, and approaches to conflict situations. Team members must examine their own behaviours relative to others in the group, and determine in which ways independent action will be most beneficial, and in which instances achieving harmony is preferable to expressing one's own personal style.

Team Competencies

Team competencies refer to the feelings, attitudes and interaction behaviours that emerge when a particular group of people come together, creating what can best be thought of as "team personality". Questions that may arise include: What does the sum of the individual parts look (and act) like? Do the individual competencies of each team member become magnified within the group, or do they become lost? Does one person set the emotional tone for the group through a process of "emotional contagion", or do the team members' different temperaments complement one another nicely?. Effective teams strive for a balance between the benefits of diversity and those of commonality. Great diversity leads to a broad range of opinions, ideas, and potential solutions to problems. Diversity across as many factors as possible (including team roles, educational backgrounds, practice experience, life experience, culture, age, gender, and personality) should lead to the most creative results. Teams that lack diversity often tend to "think alike" and end up generating fewer possible solutions to problems. Conversely, teams need to strive for commonality to achieve some sense of harmony, in that similarity of values, goals, and knowledge bases can all allow for less friction and more effective teamwork along the way.

Emotional Tone

Emotionally competent teams are aware of their emotional functioning within the team. They are also sensitive to the way in which they affect the emotions of those with whom they interact, such as patients, their families, and healthcare professionals outside of the team.

Team Attitudes and Priorities

Just as each individual brings his or her own attitudes, values, and knowledge base to the team, each team must form its own general set of attitudes, priorities and goals. While achieving consensus on all issues would be ideal, it may not be possible given the diversity of opinions of team members. Instead, teams should strive to achieve common ground regarding key issues, priorities, and team direction.

Communication & Interaction Behaviours

A team's communication behaviours are not necessarily just the aggregation of each individual's behavioural style. In understanding team communication patterns, it's important to observe the team interacting as a whole, to fully explore the dynamics that evolve when several (potentially) diverse styles must gel with one another. For example, a team filled with assertive leaders who are very good at "getting the job done" will not necessarily become a team with superior leadership capabilities. It is more likely that such a team will find it difficult to progress properly if each member wants to assume the leadership role. Teams that are performing optimally negotiate a balance of styles to achieve harmony.

Team Process

Team process refers to the specific codes of behaviour, policies, and procedures put in place by a team to support performance of the tasks the team must complete. While team process can be reflected upon and evaluated by team members, it can also be easily measured and evaluated by those outside of the team. There are three main categories of team process behaviours (commitment, contribution, and cohesiveness), each of which focuses on a different process element. Ideally, teams should demonstrate strength across all three categories; however it can be assumed that teams may be more skilled in certain process elements than in others. In determining areas in which improvement is needed, teams are encouraged to re-examine and attend to the individual and team-level competencies that will contribute to improved team-level process outcomes.

Commitment

The category of team commitment is focused on behaviours and processes that support team priorities and motivation. Teams that are working on complex tasks need a general sense of direction and specific principles to guide performance toward accomplishing set goals. Although the direction and principles may be created in a number of different ways, team members must be committed both individually and mutually to working together toward achieving those goals. Teams demonstrate commitment by articulating their values, mission, and vision, as they work to establish and maintain shared goals and priorities.

A Committed Team:

- Clearly articulates team purpose, principles, and priorities
- Agrees about the strategies necessary to achieve its goals
- Sets specific priorities and goals
- Has practices in place to ensure that members stay "on track"
- Strives for continuous improvement in its practices

Contribution

The area of team contribution is focused on team roles and the division of labour within the team. All members of a team are functioning in two capacities: as a representative of a profession with a professional role (e.g., occupational therapist), and as a member of a team with team process responsibilities (e.g., team initiator). To function effectively and contribute meaningfully, team members must consider performance in both capacities, and draw on diversity and commonality. By establishing team member roles, the team seeks to maximize the contribution of each member.

A Contributory Team:

- Has clear expectations regarding roles
- Strives for equity in terms of team member contributions
- Shares leadership duties
- Delegates reasonably in line with areas of competence
- Utilizes the abilities, knowledge, and experiences of all team members

Cohesiveness

The area of cohesiveness is focused on interactions among team members. Successful interdisciplinary teams share ideas and information in order to question assumptions, to explore areas of both agreement and conflict, and to build on one another's insights. An open and accepting atmosphere nurtures innovative thinking and leads to both trust and team cohesiveness. Openness means that team members feel secure in trying new approaches, and articulating their perspectives in an atmosphere in which others on the team will provide both constructive feedback and support.

A Cohesive Team:

- Provides its members with feedback and constructive criticism
- Has strategies in place to support team development
- Has mechanisms to deal effectively with conflicts
- Strives to achieve consensus in decision-making
- Demonstrates high levels of mutual trust

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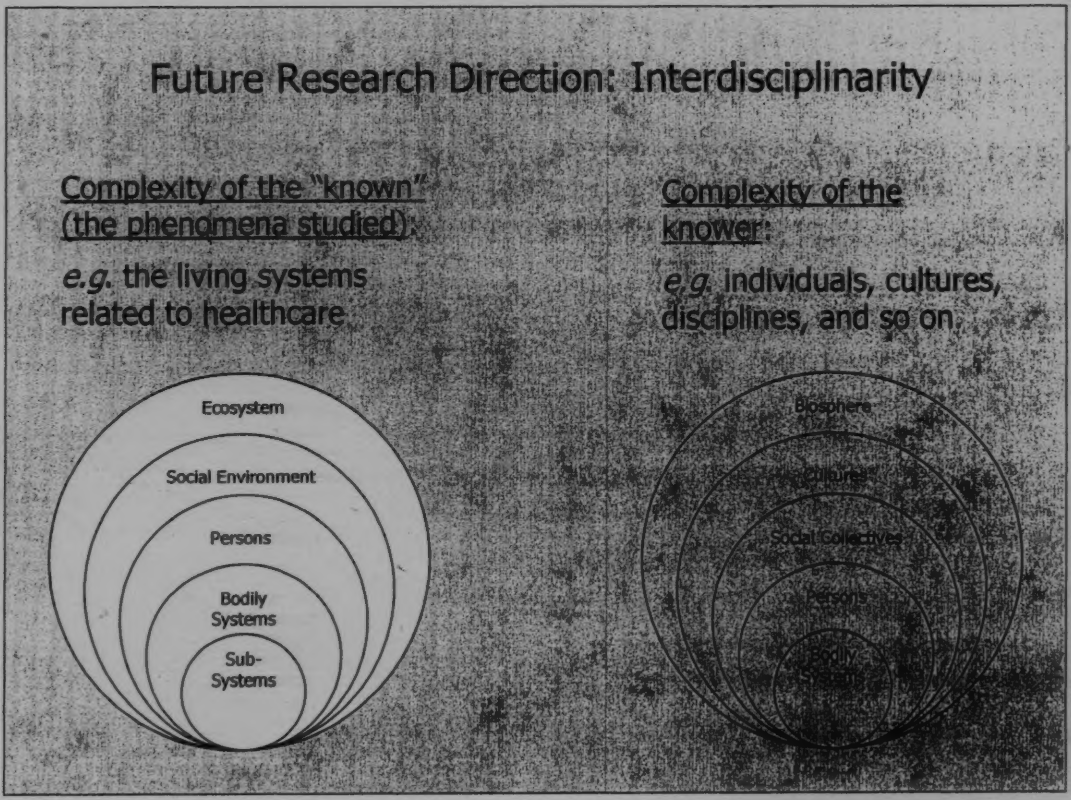
Appendix F: Understanding Interdisciplinary Relations in Health Care: Complex Systems & Complex Knowers



Future Research Direction: Interdisciplinarity

Complexity of the "known" (the phenomena studied):

e.g. the living systems related to healthcare

Ecosystem
Social Environment
Persons
Bodily Systems
Sub-Systems

Complexity of the knower:

e.g. individuals, cultures, disciplines, and so on.

Biosphere
Cultures
Social Collectives
Persons
Bodily Systems